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THE SINGAPORE GARDENING SOCIETY

HONORARY EDITOR: (*on leave*)
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Director of Gardens, S.S., Singapore.

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JANUARY, 1939.

EDITORIAL

Owing to unforeseen financial difficulties, it was found impossible to print the usual fourth issue of this Magazine in the year 1938. Volume VIII therefore consists of three numbers only. The present issue is the first of Vol. IX. It is hoped that no further lapse of this nature will occur; but readers are again reminded that this Magazine can only succeed if it receives more support from the public. The annual subscription to the M.A.H.A. is only $2/-, including the cost of the Magazine. We appeal for more members, in order to place the Magazine on a satisfactory financial basis.

That the value of the Magazine is becoming appreciated is shown by the fact that certain numbers are already out of print. Keen gardeners will find past issues of the Magazine well worth keeping and binding for reference purposes. Much of the information in them concerning local gardening practice and on new plants will not be found in any other book. All articles are original, and we endeavour to avoid repetition; but we may possibly reprint some of the more important articles from issues which can no longer be purchased.

We again appeal to our readers to make contributions to the Magazine, especially short notes on gardening technique and on trials of new plants. By sharing our successes with others we can do much to improve local gardening practice. The increased interest which has followed the establishment of Gardening Societies, and the holding of flower shows, is evidence of this. But a record in print is even more valuable; it reaches a larger circle and is available for future readers. We express our thanks to the readers who contribute to the present issue.

Keen gardeners all over Malaya are continually trying new plants; some of them succeed, and spread to other peoples' gardens, but usually the origin is unrecorded. Such a case is the yellow daisy (Melanopodium) mentioned in this issue; nobody knows where it came from or who brought it to Malaya. It would be a matter of considerable interest if new introductions could be properly recorded. Gardening Societies could help in this matter. We may add that failures as well as success are worth recording, for the benefit of others.

We express our thanks to Mr. Theodore Hubback for his valuable article on Agriculture, Fencing and Wild Life, included in this issue.

Horticulture.

NEW OR INTERESTING ORNAMENTAL PLANTS

BY

R. E. HOLTTUM, M.A., F.L.S.,

Director of Gardens, S.S.

Jasminum rex.

This, which is fittingly called the royal Jasmine, has larger flowers than any other members of the genus. The flowers are however scentless, but they are produced quite freely and the plant grows so well in Singapore that it should fill a useful place among our flowering climbers.

The history of the discovery of *Jasminum rex* is interesting. A dried specimen was sent from Bangkok to Kew in 1920, by Dr. Y. S. Sanitwongse, who grew the plant on a pergola in his garden at Bangkok. The origin of the plant was at first said to be Peninsular Siam, but later this was corrected, the true origin being eastern Siam. Then it was discovered that H. J. Murton had collected a specimen in 1882 at 5,000 feet altitude on Kao Soi Das near the frontier of Siam and French Indo-China. This fact has a local interest, as Murton was the first full time Superintendent of the Botanic Gardens Singapore (1875-1880); he subsequently made botanical collections in Siam, but died in 1882, still a young man. To continue with the history of the Jasmine, a living plant was sent to Kew in 1921, and plants propagated from it came back eastwards to Singapore a few years ago.

The Jasmine is a slender climber, but quite vigorous and freely branching under local conditions. It has climbed to the top of our pergola in Singapore. The leaves are in opposite pairs, large for a jasmine, simple, and a fine dark green. The flowers are in small clusters, each on a stalk an inch long. Each flower has a slender tube an inch long, from the end of which the petals spread horizontally; there are eight or nine overlapping petals, the whole about two inches across. The Singapore plant almost always has a few flowers open, and at times enough to make quite a show. The flowers are so large that even a few of them are quite conspicuous.

The plant appears to be quite at home in Singapore, which is rather surprising in view of the locality from which it originated. It is planted at the back of a mixed border which adjoins the pergola, so that its roots have plenty of room and also shelter from sun. Propagation from half woody cuttings is quite easy.

Dr. A. F. G. Kerr has lately written a note in the *Gardeners' Chronicle* (Dec. 3, 1938, p. 399) stating that *Jasminum rex* occurs in evergreen forests in the lowlands of S. E. Siam, near Chantabun.

Jasminum rex, in Botanic Gardens, Singapore.

Clerodendron macrosiphon, at 8 a.m., showing some flowers not yet fallen, and next evening's buds ready to open.

Clerodendron macrosiphon.

This pretty dwarf shrub was discovered in Zanzibar by Sir John Kirk, who sent plants of it to Kew in 1881. He found it growing in very rocky places on the coast. It was introduced to Singapore in 1889, and again in 1913, and is fairly common in local gardens.

The genus Clerodendron is a large one, the species varying considerably in habit and general appearance, but agreeing in the essential features of flowers and fruits. Several species are well known in Malayan gardens, and several more are common wayside plants. Most of them are shrubs, but some are small trees, and some are climbers. The best known climbing species is *C. Thomsonae* (" Bleeding heart "), and probably *C. paniculatum* (" Pagoda flower ") is the commonest shrubby one.

C. macrosiphon, so named because of its long tubular flowers, is commonly about 3 feet high, with rather small, narrow, opposite, dark green leaves, their surfaces slightly hairy, the veins deeply grooved, the edges irregularly toothed. When well grown, the plants form close shapely bushes. The flowers are in close clusters at the ends of the branches, up to about 15 in a group on very short stalks. The flower tubes are white, very slender, and about 3 to 4 inches long; they stand in erect clusters, and at first each is gracefully curved near the tip, bearing the round group of folded petals on one side. Then the petals unfold, all curving downwards, and from the open end of the tube the long purple stamens project, in two pairs, the slender style between them.

The flowers open at about 5.30 p.m. and are fragrant. On the following morning they fall, and the ground around the bushes is white. But there will be a succession of flowers again the next evening, and the next, until all the buds are opened. Then after a few weeks more flowers will come. A bed of these shrubs in full flower, either in the evening or in the early morning, is a remarkable sight. The photograph was taken in the morning, with many flowers falling, and shows very clearly the graceful shape of the flower buds.

Plants of *Clerodendron macrosiphon* need generous treatment in the way of cultivation and manuring, or they are poor and far from decorative. They are suitable for a mixed border, or can be grown in a group in a bed by themselves. I have however noticed on several occasions that after a year or so plants may lose vigour, even in spite of good treatment, but that they recover after transplanting to another place. It may be that the soil becomes infected with some disease. I have noticed the same also with *C. paniculatum* and *C. fragrans*.

A new Composite.

About three years ago I found a yellow flower of the family Compositae being cultivated at Malacca. Mrs. Gilbert Beatty kindly gave me some seeds and we grew the plant in Singapore. Since then it has become very popular, but we have hitherto been unable to find the correct name for it.

By the courtesy of Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew, we have received an identification of the species. It is *Melampodium divaricatum*, native in tropical America, where it is distributed over a wide area.

It is said to be freequently cultivated, but is not mentioned in any of the standard gardening works at our disposal, and I do not think it can long have been in Malaya. It would be interesting to know how it reached Malacca.

Melampodium divaricatum has a rather stiff and regular habit of growth, and its flowers are not large; but the colour is a good bright yellow and each flower is a pretty star shape, with about 12 rays. The plants are also very easy to grow and flower freely for a much longer period than the ordinary annuals. They are equally good for pots or borders. Though they are not perhaps first class garden plants, they are exceedingly useful, and in Malaya we cannot afford to be too critical where annuals are concerned.

The name Melampodium means " black foot." According to Dr. Backer, it was originally used by the Greeks for the Christmas Rose (Hellebore) which has black roots. The present plant has not black roots and I do not know why the name Melapodium was applied to it.

Each " flower," as usual in the family Compositae, consists of a number of separate small flowers or florets. The outer florets, forming the spreading rays or " petals " of the whole " flower," are female and produce seeds. The small central flowers are all male and produce no seeds. There is thus a row of seeds round each flower head, just inside the ring of green bracts.

The plants produce seeds freely, and as above mentioned, are easy to cultivate. They require the same treatment as other annuals, and will repay careful cultivation, though they will make some sort of a show with little attention. We have found them useful to mix with pot plants of other colours, to give a touch of yellow, which brightens the whole group.

Asclepias curassavica.

This shrub, native of tropical America, and now spread throughout the tropics, is occasionally found in Malayan gardens, the sole local representative of a large genus in the New World. In the United States the various kinds of Asclepias are called milkweeds, as they have a copious supply of white latex. The present species has also been called Curacao Ipecacuanha, as it was said to have similar medicinal properties; but it is not really a substitute for Ipecacuanha, and actually contains a dangerous poison.

Asclepias curassavica has very pretty bright flowers of a most unusual kind. The petals form a five-rayed star rather more than half an inch across, and are a brilliant orange-scarlet. They tend to droop somewhat, and above them rises a sort of miniature crown formed by the deep yellow appendages of the stamens. It is this contrast of bright colours, together with the decorative shape of the crown that makes the flowers so attractive. The effect is enhanced by the way the flowers are produced in close groups of ten or more, on slender stalks all radiating from the end of the main stalk.

The structure of the flower is very complex, as in all plants of this family (Asclepiadaceae). Very careful dissection under a lens is needed to observe the details of structure. It will suffice here to say that the pollen is produced in masses, much as in orchid flowers (though the Asclepias family have no relation-

Asclepias curassavica, half natural size.

ship to orchids). There are certain slits in the crown of the flower into which a visiting insect may insert a leg; the sticky ends of the pollen masses then clasp the leg and the insect carries them away to pollinate another flower. The details of the arrangement are entirely different from that found in orchids, but the principle is the same. Other garden plants of this family are Stephanotis, Pergularia (" Bunga Tonkin "), Raphistemma (see this Magazine Vol. 5, p. 164, with illustration) and Hova (local climbing plants with fleshy leaves and waxy flowers).

Asclepias plants grow to a height of about 3 feet. They do not branch much under local conditions. The leaves are opposite, rather long and narrow, thin in texture. The flowers are produced in erect clusters at the ends of the branches. The fruits, when produced, are erect pointed pods, bursting open and displaying a quantity of silky hairs surrounding the seeds. These hairs are sometimes used like Kapok for suffing cushions but are too stiff for use in making yarn. The stems of the plant contain a flax-like fibre which is sometimes used, but nowhere in any quantity.

The plants are rather too stiff, and do not produce enough quantity of flowers, to be really decorative by themselves, but they look quite well in a mixed border, where they produce small patches of bright colour. When the flowers are cut, a quantity of milky juice exudes, which probably clogs the water channels; at any rate, cut flowers very quickly droop, unless cut quite short and plunged immediately into water. It is possible that longer stalks may be successfully cut if this is done early in the morning and the stalks at once immersed in deep water. However, the best use I have found for these flowers when cut is in " posy rings " or small troughs of bamboo, in which short flowers are mixed. In such a mixture, Asclepias flowers give a most distinctive touch of colour, enhanced by their very dainty habit.

The plants may be propagated either by cuttings or from seeds. They need a sunny place and are probably best in a light soil. They will flower within three months of planting out and remain flowering continuously for a considerable period. I find however that the plants tend to become poor after a year or so and are best replaced by new ones. It is probably better also to put the new plants in a new place.

Tecomaria capensis.

This attractive plant, sometimes known as the Cape honeysuckle (though not much like a honeysuckle in growth), is native in South Africa and has been widely cultivated in most other parts of the tropics and sub-tropics for its beautiful bright orange flowers. In climates which suit it well, it is a woody climber.

In Malaya it has been little grown until recently, when a new variety has appeared and become popular in Singapore. Plants have been grown for many years in the Botanic Gardens, Singapore, and have flowered occasionally, often in wet weather (which is rather curious in a species from a drier country). They grew into moderate sized shrubs, but never showed a really climbing form. They had a habit of dying back suddenly, owing presumably to some disease in the

soil, and were in fact not very satisfactory garden plants, though very pretty when in flower. They were propagated both from seeds and cuttings.

Possibly a chance seedling in Singapore showed better adaptation to local conditions. At any rate, two or three years ago the Chinese gardeners began to grow *Tecomaria capensis* as a pot plant, and it gave a very attractive show of flowers, flowering almost continuously. We at first thought the more free-flowering habit was due to pot culture, but on comparison it appears that the old strain in the Botanic Gardens is no more free flowering in pots than in the ground. It is clear that the plant grown by the Chinese is a distinct variety, though it can hardly be distinguished in anyother way than by its free-flowering habit. It appears to be more dwarf in size than the older variety, and behaves so far as an erect shrub when grown in the ground. It is too soon yet to say how large it will grow under such conditions, or whether it is more resistant to soil diseases than the old form. It is easily propagated by cuttings, so that the strain can be preserved. It does not seem to produce seeds so freely as the old form.

The species was formerly called *Tecoma capensis*, but botanists have split up the old large genus Tecoma into a number of smaller genera, owing to considerable differences in the structure of flowers and fruits. Though very similar in general appearance to the well known yellow shrub *Tecoma stans*, Tecomaria differs in having four rows of seeds in the pod instead of two rows, and in the anthers being joined together.

Here is another example of a most desirable new ornamental plant which has mysteriously appeared among us, nobody knowing its origin.

GROWING SALAD VEGETABLES *

BY

J. C. NAUEN,

One of the most palatable and appetising dishes for hot days is a well made salad, but the trouble in this country is that some of the salad vegetables available in the local markets are not regarded as too safe, and others aren't always particularly good. The solution is to grow them yourself. It's not at all difficult and even if the results aren't as perfect as you'd like, they are at least refreshing and eatable. They're comparatively cheap to grow, too, and don't take up much space in the garden—in fact, many of them can be grown in boxes and pots, so even the flat dweller can grown them if he wants to.

When you begin, do so in a small way and confine yourself to one or two kinds at first. If the results give you satisfaction, branch out and grow others and with a little experience you will soon be eating all the salads you want. Diseases and a few pests may worry you at first, but don't be discouraged. The judicious use of a flit pump full of insecticide will cure most of your troubles, and care in the preparation of soil will dispose of the others.

Now first of all you must set about making the beds in which you will grow your plants. Singapore soils on the whole are heavy, so that liberal quantities of humus such as leaf mould, ashes from burnt rubbish heaps, well decayed grass clippings and so on should be added to the original soil. Salad vegetables on the whole like a light sandy soil which is rich in humus. They're gross feeders, and plenty of manure should be given often, in small quantities. Lime will to a certain extent make clay soil more friable, but it should only be used in very small quantities, as any large amount only tends to impoverish the soil through the loss of too many valuable chemicals.

Begin by digging up your beds. They should be not more than three feet across, and should be dug down for a depth of twelve to fifteen inches at least. If you remove half the soil from the bed you can then fork a very liberal amount of manure and humus into the bottom soil. This will provide a rich reservoir of food for the plants, and will induce the roots to grow downwards instead of keeping to the surface. The top soil should then be forked in, well dug and mixed with a good supply of well decayed manure and humus. This upper soil should be light in texture, and should rise at least six inches above the normal level of the ground. If you look at a market gardener's plot, you'll see that all the beds are raised above the level of the surrounding ground. This is done to ensure that the beds are well drained, which is essential for quick growing vegetables. Cultivation, that is to say, digging, and good hard digging too is an excellent practice as it aerates the ground. When your plants are growing the soil should be dug continually round them and coarse sand and ashes mixed with the earth to help keep it open, assist quick drainage, and prevent water stagnating round

* **Broadcast from the B.M.B.C. station, Singapore, on June 23rd, 1938.**

the roots of the plants.

If you're going to grow your vegetables in pots or boxes, use burnt earth mixed with a tenth part of dried cattle manure, similar to that used for potting flowering plants.

When it is necessary to shade plants from heavy rainfall and too much sunlight, all that is needed is a light shelter of coconut leaves on a rough bamboo frame. Any kebun can construct such a shelter very quickly.

The most important thing to remember when growing salad vegetables is that they must be grown quickly. Plenty of manure, plenty of water, and plenty of sunlight at the right time will give you excellent results.

There are eight varieties of salad vegetables with which I propose to deal to-night, and all, with the exception of onions, may be grown from seeds. The onion may be grown from seeds too, but it is much better to purchase " sets " locally.

Now first of all, tomatoes. These are perhaps the most difficult of all the salad vegetables one is able to grow in Singapore, not so much because they are difficult to cultivate, but because they are susceptible to one or two rather prevalent diseases, and insect pests. A soil fungus and a small maggot, which enters the stem of the plant below or at ground level, result in its complete collapse for no apparent reason at a stage when you are expecting the plant to show signs of fruiting. This malady, together with lesser troubles, makes tomato growing difficult. There is, however, a remedy—the use of burnt earth, in boxes or pots, and the use of some soil sterilizing agent. The use of clensel, or corrosive sublimate at the rate of one ounce to ten gallons of water has proved successful. Both preparations may be watered about the base of the plants at intervals during their growth. I don't know of any varieties which are immune, but I've noticed that the small cherry tomatoes aren't so frequently attacked.

Seeds should be sown in clean pots containing a mixture of burnt earth and a little dried cattle manure and covered with about a quarter of an inch of shifted burnt earth. The pots should be stood in a place shaded from direct sunlight and away from heavy rainfall. After the seeds have germinated and the plants are about three inches high the first transplanting should take place. Small pots filled with a similar soil to that used to germinate the seeds in, but with a greater percentage of manure are used. Each plant is potted up singly. The plants should be kept in these small containers until well established and during this time should be exposed to sunlight and kept in a fast growing state by fairly frequent watering and an occasional application of manure water. The strength of this manure water may be increased as the plants gain strength. When they're established, they may be either planted out in beds or in twelve or fifteen inch pots or into boxes. The soil at this stage for pot or box growing should be considerably richer and may, if at all procurable, contain bone meal and broken up mortar rubble. The small amount of lime contained in the rubble helps to keep the soil sweet and friable.

During growth the plants should be occasionally dusted with flowers of sulphur as a preventative measure against " red spiders " and other pests. Tuba

root or clensel may also be used; all side growths other than those which will produce the fruits, should be removed at their inception, and the plants grown on one stem. The plants should be staked when they show signs of needing support.

During their adult stage, tomatoes may be exposed to full sunlight but I think it's advisable to give some light protection from the mid day sun if possible.

Next we come to mustard and cress, one of the most refreshing of salad vegetables, and very easily grown. The best method is to grow them in boxes under the shelter of the verandah in rich soil, and in order to have both ready for cutting at the same time it's best to sow the cress seed four days before those of the mustard.

The sowing of the seeds of these plants differs from those of most other vegetables in that they aren't covered with soil. Sow the seeds evenly on the surface of the soil and then place a pane of glass over the top a few inches above the surface. The glass is kept as a covering until the seeds have well germinated. Some people keep the seeds quite dark until they've germinated. Successions of sowings should be made every two or three weeks to keep a continuous supply. Cress will be ready for cutting in about nine or ten days from sowing, and mustard in five or six.

Radishes, as is the case with most salad vegetables, must be grown quickly and without check. Seeds should be sown in drills in the open ground at a depth of half an inch, and should be shaded from heavy rain and direct sunlight until well germinated. When the plants have produced their second pair of leaves, soil should be mounded about the base of the plants. This will insure proper tuber formation and hold the plants firmly in position. It is a good idea when mounding the earth to mix in a sprinkling of good, quick-acting commercial fertilizer along the sides of the rows; and more fertilizer can be added every third day for about nine days with good results.

A variety sold under the name of " french breakfast " is considered one of the best varieties for local use. Radishes should mature in three to four weeks after sowing.

Young carrots are excellent for salad purposes. Seeds should be sown thickly in drills half an inch deep in the open ground, and covered very lightly with soil. Seedlings should be thinned out as soon as the plants are large enough, to one inch apart. No transplanting is recommended except to fill in gaps in the rows. When the plants are about three inches high soil should be mounded up about the plants from either side to form a small ridge. This is very important, as the root, especially the top where the leaves arise, must be shaded from all light. A little artificial manure sprinkled lightly on either side of the row but not so as to touch the foliage at the time the plants are mounded up will help considerably.

Succesional sowings may be made at three or four weeks' intervals to insure an almost continuous supply. Carrots are at their best for table and salad purposes when pulled young. They may be pulled about forty to fifty days after sowing; and the forcing varieties are best suited for local cultivation.

And now for the mainstay of every salad—lettuces. The best variety for cultivation in Singapore is one known as " mignonette," which is of a compact

habit and will make a small heart.

Seeds should be sown in boxes preparatory to planting out permanently. Seedlings should be allowed to grow to a height of two inches before transplanting as they are then easily handled. Lettuce plants can be expected to grow at least six inches across, and should therefore be planted out at a distance of about nine inches apart. It is, however, a good practice to grow the plants closer together and to pluck them sooner at a stage when the leaves are young and tender. Everything possible should be done to induce the plants to grow quickly and without check; watering liberally during dry weather and adding a little quick acting artificial manure about the plants while they are still quite young will help. Lettuce plants must be shaded from strong sunlight but may be exposed with good results, to morning sun. It takes about sixty to seventy days for lettuce to mature after sowing, but the plants may be used after one month's growth.

Lettuces may be grown in boxes quite as successfully as in the open ground.

Onions. Onion sets can be bought locally and planted out six inches apart in beds in the open without protection, and give quick results.

Differing from other salad vegetables in that they are not grown from seed, onions require little attention. The sets are planted out six inches apart at a depth of about two inches, growth starts almost immediately after planting, and there remains only to dig up the bulbs again after a period when several young growths will have sufficiently grown to give what is known as " spring onions." Thirty days after planting the sets the plants may be dug up and used.

Water cress can be grown quite successfully in Singapore in beds similar to those used for other vegetables. It isn't necessary to grow it in water beds. Cuttings of plants should be planted out at intervals of six inches and in a very short time the whole bed will be covered with plants.

Cucumbers can be grown from seed, which may be planted in the open directly or in boxes. If they are sown in the open ground it is usual to sow two or three seeds together in one shallow planting hole to insure at least one strong plant. When sown in boxes the seedlings are transplanted into the open at a distance of eighteen inches apart when the plants are about six inches high. It is customary to plant double rows at a distance of two feet apart, and to build a frame work above the plants to a height of four to six feet. The plants are encouraged to grow over the framework and fruit, their fruits hanging down under the protection of the leaves.

As with the tomato, soil fungus and maggots take heavy toll of the plants unless some form of soil sterilization is practised. Seeds of local strains should be procured, and the average time for fruits to mature is forty days after sowing.

Lastly we come to parsley, and although it is not a salad vegetable it can be dealt with here. Parsley thrives best in a comparatively poor soil, and therefore doesn't require the same attention as other vegetables. Seeds should, however, be sown in boxes before planting out and given similar treatment to other small seedlings. Planting out should take place when the plants are a few inches high and every care should be taken to see that they aren't fully exposed to strong sunlight. The plants will occupy about six square inches of space in the beds,

and should therefore be planted out at this distance apart. Successional sowings should be made, according to requirements, throughout the year. Parsley may be used sparingly after about six weeks of growth.

That, I think, will give you sufficient information to start growing your own salad vegetables. As I remarked at the beginning, start with one or two varieties, and when you have gained experience and confidence, you can continue with the whole range if you feel so disposed. I hope you will. The trouble is amply repaid by the salads you will be able to offer your friends.

MISCELLANEOUS HORTICULTURAL NOTES

A method of growing Zinnias.

The seeds are sown in very shallow flower-pots, about 4 inches high and 15 inches wide. Garden soil mixed with sand and sieved is used. The pots are kept in a shady place until the seeds have germinated and two leaves appear. They are then put into the sun for a day or two.

The flower pots for Zinnias should be about 12 inches wide and 9 inches high; they must be thoroughly cleaned before using. The pots are covered at the bottom with plenty of broken bricks, and two-third of the pots filled up with a mixture of three quarters burned earth and one quarter German peat moss (which can be bought from the local agents). Four seedlings are planted in one box. The best time for planting the seedlings is late in the afternoon. The pots are kept for 2 or 3 days in a shady place where they get only the morning sun. After that they are put fully into the sun and as the plants grow, the pot is gradually filled up with the same mixture till about 1 inch from the brim.

For manuring " kachang " is used, which is broken into pieces about the size of a walnut. Four of these pieces are pushed into the soil of every pot, about half an inch to one inch deep, one between every plant. This should be done as soon as the plant has four leaves. After that, the kebun uses a certain liquid manure which is made by soaking the feathers and intestines of fowls in water until they rot. Most kebuns know how to make this. It is an excellent manure, but it has a very unpleasant odour for a few hours after using it. The kebun usually waters the plants with this solution late in the afternoon and he does not give them any more water that day.

The plants are often sprayed with tuba-root solution, and in order to avoid the curling of the leaves, they are freely sprayed with powder of sulphur early in the morning when the leaves are still wet from the dew.

As soon as the first bud appears, one should break it off. This will help to produce a more bushy plant.

If the leaves are eaten up by grass-hoppers or other insects which visit the plants at night, they should be inspected in the evening with a torchlight and the insects collected and destroyed.

Zinnias should not be watered too much, especially after the first buds have appeared.

C. SCHMIDT,
Singapore.

Propagation of *Odontadenia speciosa*

A year ago I was cutting back the Odontadenia after it had finished flowering, and thinking I would try an experiment, I stuck five of the finished flower shoots into a tub, leaving one leaf on each cutting. The tub was in a place which was sheltered from the hot afternoon sun, but the cuttings had no special soil or care, as, knowing they were rather difficult to propagate, I did not expect them

to strike. They apparently did nothing for some time, but at the end of about three months they all sent out strong shoots, and now at a year old they are strong plants and one of them is flowering for the second time.

I don't think this can be all luck, as I gave Mrs. Byron of Jesselton a flower shoot from a base of Odontadenia I had in the house, and she took it home and planted it, and in a letter I received from her this week she tells me that it has developed strong roots.

15-8-1838.

V. H. RICE-OXLEY,
Sandakan.

Flowers of different colours on the same plant.

Cases in which flowers change colour as they grow old are common. The best known example is probably *Hibiscus mutabilis*, the flowers of which open pure white in the morning and change to rose colour in the afternoon. The potato tree, *Solanum maroniense*, has blue-mauve flowers which fade almost white, and *Brunfelsia calycina* (" yesterday, to-day and to-morrow ") shows the same change. The last named plants have flowers which remain open for several days, so that flowers of several shades are present together.

There are rarer and more interesting cases in which flowers on one branch only of a plant may change colour. Such cases are accidents or " sports." If the branch bearing such a flower is removed and grown as a cutting, a plant results which has only flowers of the new colour. The most interesting recent example of this is Bougainvillea Mrs. McLean (and B. Louis Wathen) which originated as a " sport" on a plant of Mrs. Butt. Hibiscus plants have also been found to produce flowers of a different colour (see this Magazine Vol 6, p. 172). Cannas sometimes produce flowers which are partly yellow and partly red, instead of all yellow or all red.

Recently cases have been reported in which plants of Bougainvillea Mrs. McLean have reverted to the crimson colour of Mrs. Butt on one or more of their branches. This reversion, representing the regaining of a colour once lost, is rather unusual. Plants of Mrs. McLean in Mrs. W. D. Barron's garden and in the Istana Gardens, Johore, have shown flowers in which parts only of each bract have the crimson colour, the remainder being orange.

A case of colour change in quite a different flower has also been reported from the Istana Garden, Johore, by Mr. L. A. Logan Richardson. A plant of *Malvaviscus Conzatii* (see this Magazine Vol. 6, p. 96) which normally has bright red flowers something like a Hibiscus, produced pale pink flowers on one of its branches. This variety should be quite useful if it can be propagated. It represents loss of red colour, as in the case of Bougainvillea Mrs. McLean.

While on the subject of *Malvaviscus Conzatii* I may mention that this species is badly attacked by beetles, which reduces its value as a garden plant. Spraying with lead arsenate is effective, but spoils the appearance of the plants temporarily.

R. E. HOLTTUM.

THE PLEASURES OF GARDENING

BY

THREE OF OUR READERS

1. What we did with our Garden.

We are one of those unfortunate couples who never have a garden for any length of time and always seem to go to a house whose previous occupants have cared nothing for flowers. At first this continual moving from house to house—we occupied six houses during our first four years in Singapore—rather cramped our efforts in the garden. When we were temporarily occupying other people's houses we felt we could do nothing but grow flowers in the beds already prepared, when what we thought was necessary was complete reconstruction. Latterly we have been more lucky in occupying two houses which were not actually anybody else's, and we set about putting our own ideas into practice at last.

In the first house, which we occupied for just under a year, though we didn't realise it was going to be for so short a time, we developed our plans and learned a lot. We had just sufficient time to see what was happening, and to realise where we had been wrong—and didn't have to stay to put our mistakes right ! Although we knew we should only be in the next house for two years, we decided to do what we could and ignore the impermanence. The garden when we took it over was entirely lacking in anything beyond a few shrubs, a number of beds of shaggy Cannas, and some trees. It is a big garden, and it takes the kebun all his time to keep the grass cut. We soon levelled the ground sufficiently for him to cut it all with a machine, which gives a better appearance as well as being much quicker.

I said the garden was devoid of flowers. This was not strictly correct, for on the only level strip of garden—a piece about ten feet wide and fifty feet long. in front of the house—there was a mass of beds. There must have been a dozen beds of Cannas, three of very much unpruned roses, some Hibiscus bushes, Bougainvilleas and Crotons, each in beds of their own. Now there's one thing we do like in a garden, and that's a piece of flat, unbroken green—so we got in a couple of coolies for a few days, levelled up all those beds, rooted out everything except two rather nice standard Hibiscus, straightened up the bank, and planted grass. At either end we made a big bed of Cannas, bordered with white lilies, and round the porch itself we placed our flowering pot plants.

While we were waiting for the grass to grow (which took a surprisingly short time) we worked out a plan of the garden. In the wide open spaces running down from the level stretch to the bottom of the garden we decided that flowering trees were the only solution with a few shrubs to fill in gaps and give some colour to the landscape. Down one long stretch of hedge we planned a wide shrub border, with paths leading to the tennis court; at the side of the house we planned a rose garden, and the back we left more or less as it was.

That plan has now been discarded, but it helped when we began. The shrub border proved impracticable, owing to trees in the next door garden, so

we abolished it, planted more trees, with orchids between until the trees grow big enough to shade them. The paths had to be abandoned, because the expense was too high for the time we shall occupy the house.

But we did plant trees—bungors, the yellow flowering tree, Cassias, tulip trees and so on. They are all growing well and will be a good size by the time we leave. In fact, the next occupants will probably have to cut half of them down ! But they will give a very welcome shade, and as they are considerably below the level of the house, they will not obstruct the breeze, or spoil the view.

We found too, that although the house has been occupied for about seven years, the passage to the kitchen overlooked the dining room and one of the bedrooms, and no one had ever done anything about it. We grew rather tired of watching the " boy " bringing in the dinner while we sat at the table; so we planted a hedge between the passage and the house, and now we have a pleasant greenness to look at instead.

We still had no flowers. When the grass grew along the level piece in front of the house we planted a Hibiscus bush at either side of the steps leading down the bank, and at the foot of the bank we made a border. The border has been the most successful experiment, as over a period of almost a year part of it has always been in flower. This was the result of reading an article in a gardening book, and hearing a talk given to the Gardening Society. We mixed shrubs and herbaceous plants—the main ingredients being Russellia, Tecoma stans, Allamanda, white and varigated Angelonia, and Coreopsis, with a sprinkling of Galphimia, Poinsettia, Lantana, michaelmas daies, golden rod and Plumbago. From time to time we plant annuals such as Balsams, Zinnias and Celosia, with the result that there always seems to be plenty of colour. The bed has not been completely re-dug since it was planted, but sections of it are being continually replanted, manured and dug. Sometimes the border looks like an illustration in a flower catalogue (but not very often, sad to say) and at other times it looks a mess, but when this awful event occurs we go along with a pair of clippers, cut ruthlessly, pull out here and there, put in some seedlings, add a little manure, and in a week or so our colour is back again.

We are still continually altering, replanting, filling up beds and making others, but what fun it is ! That we find is the best of gardening in this country, where so much is disappointing. If you decide to replan the whole garden, you haven't a great deal of time to wait before you see results.

The great disadvantage of continual moving is that one doesn't feel inclined to spend too much money, and that is almost essential to make a real success of a garden. We could do with a lot more to spend on putting down crazy paving, erecting a fern house, constructing ponds and so forth, but probably the next people in the house would have a rooted objection to all these things, and our money would be completely wasted. But whatever disappointments we have, and however far short our garden falls from our ideal, at least we have enjoyed months of working in it—and we have gained a great deal of experience which should help to make our permanent garden a real success. But I'm afraid that won't happen until we go home to England—and then our experience won't help us much !

N. R.

2. Random notes from a Borneo Garden.

The last quarter has been a comparatively uneventful one in our gardening world. We have had our share of rain and drought, but at the moment there is a good display of colour. " Mrs. Butt " vies with the Jacaranda, and the Morning Glory with its rich blue blossoms peeps between as it twines its way up a coconut palm.

Our geranium plants which had such care bestowed on them are looking flourishing with a real English " furry " surface. At present there is no sign of any flower buds, but this is to be expected as for some time the plants had to be grown under mosquito wire to prevent them from being attacked by some elusive noctunnal pest. We hope that they will eventually bloom now that they have been given free range.

Our Japanese fern balls and designs which for sometime have been losing their former beauty, to say nothing of their framework having fallen to pieces, are now doing well in the ground in the fern house. It is surprising how long these fern lasted without soil, and when the frail structures fell apart there were still definite signs of life in the rootstocks, so we planted the whole designs just as they were, only removing porcelain portions. Small fronds are now appearing above the ground.

Not long ago we were out for a walk, and on passing some coolie lines, noticed on a rubbish heap so beloved of these people, a glazed jar. On rescuing it we found that although the glazing had been chipped away on one side, the jar itself—a dark peacock blue—was intact. The Chinese " jagar kongsi " although no doubt thinking we were more mad than the usual foreign devil helped us to wash the jar in a nearby stream. " Tuan " asked facetiously, " Ini 'Ming' punyah? ", to which the prompt but native reply came, " Bukan, Tuan, samsu punyah," so that was that ! Nevertheless we brought the jar home and we feel as we look at it that even now we may be cherishing some valuable jar of a famous dynasty ! With a homesick pang I yearned for a spray of spindlewood, hips-and-haws, copper beech, or pussy willow to place in the jar, but found happy alternatives in bunches of the bi-coloured excoecaria, crotons, and also sprays of Bougainvillea stripped of their leaves.

In a book I was reading recently I came across a new use for the male papaya blossom. The book is written round life on a tropical island, and it may be assumed that the author who spent some time there himself, knows his subject. To quote him, " Our unsullied appetites demand few condiments. Why olives, when if need be . . . . . as shrewd a relish and as cleansing a flavour is to be obtained from the pale yellow flowers of the male papaw steeped in brine—a decoration and a zest combined." We have not yet tried out the recipe, but when we do we shall introduce it to the local club, and perhaps one day visitors will be intrigued by the unusual cry of " Boy, bawah bungah papaya." In the mean time we are sticking to the good old peanut, chipped potatoes, and olives when we are in funds !

Whilst on the subject of strange and new dishes I should like to mention one I tasted recently for the first time. A brief description of it is not out of place here, as the basis of the dish was found in the garden, to wit a hornets' nest. The dish consisted of the young hornets and their grubs, fried and made into an omelet to disguise them for our fastidious European tastes. Our " hosts," the Hylam servants, had their share fried naked. It was rather tasteless, and 'ard on the 'ornets as a dear old gardener we know would say.

We had one thrill the other day on discovering our first bunch of *Odontodenia speciosa* in bloom. This plant with its deceptive yellow buds which open out into salmon-pink, is a joy, and such a change from the usual pink flowers so profuse in tropical gardens. We have a wire netting fence planted its full length with these flowers, and are looking forward to the time, not far off I hope, when all the plants are in full bloom.

We were recently given a small quantity of Hortomone A on which to try our amateur hands. We took cuttings of different Bougainvilleas, pink Cassia, and Hydrangea, and as instructed soaked their cut ends in some of the Hortomone A solution. The cuttings have struck and are definitely sturdier and more bushy than any other cuttings previously taken, but unfortunately as we did not try out any others at the same time as those treated with Hortomone A, we cannot verify whether the marked progress is entirely due to the soaking. We hope to complete the experiment next time by applying both methods, thus enabling us to compare results.

I am glad to say that our " Purple Emperor " papaya is now flourishing and bears a very promising crop of fruit. By the way, I wonder if it is this species of papaya cropping up again in the following note by " Anak Singapura " in a recent issue of the Straits Budget ? He says, ". . . . we need some enterprising orchardists to introduce the red Java papaya. While staying at a hotel in Garoet recently I was served a dessert consisting of red and yellow papaya chopped up in squares which looked so colourful that the most inveterate papaya-hater could not have resisted it." Malayan Mems note !

I was surprised to learn that the red Java papaya, if it is the Purple Emperor (meat red, and leaf stems purple) is not more common in Singapore. There are several European gardens in this district growing this variety although so far we have not yet introduced it to the local Hakka gardeners.

It was brought home to me very vividly the other day how little our tropical gardens change in this land of no seasons, when I saw some photographs of an attractive modern thatched cottage and its charming garden; a cottage and garden one does not usually expect to see outside the pages of " The Lady " or "Country Life." A stretch of lawn runs down to some rough stone steps, and on the lower terrace is a pond and rockery. The background to all this is a little wood of silver birches. I expressed my genuine admiration of the place, and I was then shown photographs of the same little house and garden in the depths of winter. Ugh, it made me shiver to look at them. The pond was frozen and everything was hidden under a fall of snow. Gone was the mellow thatched roof, gone the sheen of the silver birch bark. To those who get tired of our everlasting summer,

remember, our lawns are always green, and the garden always a blaze of colour be it from the blooms of the Bougainvilleas, Hibiscus, or other of our quick flowering tropical bushes.

D. I.

3. A Fork, a Pick, and a Watering-can.

This article is not written for the eye of an agriculturist, not yet for those who know something of botany and the art of landscape gardening. It is for those who in their leisure hours garden because gardening, and the cult of flowers is in their blood; and after a life of serious activities when leisure comes, turn to gardening because they cannot help it.

I know a little girl who used to garden with me, she would brink a fork, a pick and a watering can and busily destroy everything living in her own little plot. Now she has grown into a beautiful woman, greedy for the good things of this life. The other day she asked me " What are the things that are really worth while, and last ? " And since I did not dare to answer quickly and without due thought, she continued " Do we all finally turn to flowers and gardens, a fork, a pick, and a watering can ? " Well this article is written for those who do, and may it bring them the happy hours it has brought me.

My garden, like many others in Malaya is on a hill; in clearing the site for the house, the top of the hill has been cut off and levelled so that all the good soil has been removed. My flower beds are really trenches filled with good imported earth and manure. On one side of the garden there is a steep bank, about twelve feet high, on top of which bluka and jungle trees make a screen between our house and the next. One day I was considering this ugly looking bank and noticed how well some of the ferns and flowering weeds were growing, and as I looked the bank faded and in a vision I saw a mass of flowers and coloured leaves, for here the top soil had been left. The bank was cleared of grass and rank ferns, the bluka was cut back on the top for two or three yards, and then I started in on it !

I dug innumerable holes and pits in the bank, and on the top I dug a trench, and filled all in with good manured soil. The fun had begun.

I planted everything I could find. I am fortunate in that my bank faces south and that one end receives all day sunshine while the far end is shaded, the possibilities were unending. I planted all the varigated leaves—coleus, aroids, ferns, different varieties of Begonias, Achimenes, Verbena, Zephyranthes, Lantana, Morning glory.

The Balsam trouble has been solved, for I planted them high up, so that they are seen from below and their crown of green leaves no longer hides the beautifully coloured clusters of flowers round the stem. I planted things to creep up and plants to hang down, anything and everything went into my bank; any seedlings over from the garden beds, any little cuttings from my friends' gardens. I brought back plants and ferns from the jungle, I bought odd plants from market gardens. My bank is even more beautiful than my original vision.

There is no hard work required, a little stooping for the lower nooks and cranies, a little balancing on a rather rickety pair of steps, but it is mostly pottering from a comfortable stance: nursing favourites, killing snails and other pests, and where necessary replanting seedlings that have come to grief.

Indeed all that is necessary is " a fork, a pick, and a watering-can."

E. M. M. C.

Agriculture

AGRICULTURE, FENCING AND WILD LIFE

BY

THEODORE HUBBACK.

Although fencing should be a concomitant of most forms of Agriculture its use in Malaya does not occupy that prominent position to which it is entitled, nor is it generally appreciated that some sort of fencing is a usual adjunct to a complete husbandry.

By dividing Agriculture into two broad headings, Permanent, and Temporary or Seasonal, one can analyse the systems of fencing that are or might be employed in Malaya.

Permanent.

Rubber Estates must be considered as coming within this category. Para Rubber is unfortunately attractive to several species of wild animals and some domestic stock, but the only really formidable species to the company or individual ready to fence and to fence properly is the elephant.

It is probably not an economic proposition to protect an agricultural property by fencing that an elephant could not destroy if it really tried, but that does not mean that elephants cannot usually be kept from coming on to a property by some sort of an obstruction.

Where large properties are situated in country which wild elephants are known to frequent some steps must be taken against unexpected raids. The Plus Valley in Perak is perhaps the best example of the extensive damage that can be done by elephants to rubber plantations where insufficient or inefficient steps are taken for protection, and how almost complete immunity was obtained when proper steps were ultimately taken. An account of the history of the undertaking is fully described in Volume I of the Report of the Wild Life Commission of Malaya up to the time when concrete proposals were put forward to meet the menace of the elephant raids. These proposals, put into practice, solved the difficulty. Fencing, in this case, was not the solution of the problem, but the incident is quoted to show that agriculture can be guarded even against elephants when the question is tackled with knowledge and resolution.

In terrain where elephants are in their true habitat there will probably be found sambhur deer, a species of wild life not *persona grata* with agriculturists. Anyway whether sambhur deer are found in the vicinity of rubber plantations in conjunction with elephants or not the precautions which have to be taken to keep out sambhur will also help to check incursions by elephants.

So I will first of all presume that the problem is one of protection against deer raids and then explain how the steps I advocate will re-act against elephants. Whatever precautions are taken the ultimate object must be to obtain immunity from entrance by sambhur deer, the animal we will consider first.

There has been much controversy on the subject of damage done by such deer to agriculture, which reached its climax—I refer to the controversy not the damage—on July 1st 1929 when, as a sop to a section of the community, all protection was removed from elephant and sambhur deer. Then the smallest fawn to the largest stag could be killed, snared, shot, captured or injured by any means or in any manner and no property whatsoever in the animal so obtained was vested in the State. Still raids did take place because such methods did not and could not keep wild animals away from unfenced cultivation. Immunity could only be obtained when sambhur deer had been exterminated.

There was a good deal of agitation against this unrestricted slaughter and the exterminators did not get it all their own way because ultimately sambhur deer were once more recognized as having some claim to live and were again given protection in 1932.

Many agriculturists after this abortive though destructive experiment realized that fencing was the only real safe-guard against sambhur raids and those wise enough to appreciate this and generous enough to look upon the cost of fencing as a form of insurance, adopted some type of fencing.

A well known planter, Mr. K. P. Reynolds of Negri Sembilan, in his evidence before the Wild Life Commission gave the following answers to four questions relating to this subject:—

Question No. 12a.

Do you think that fencing is a good safeguard against the inroads of wild animals on to cultivated areas ?

Answer.

A fence quite adequate against Sambhur is easily and cheaply put up. Where there are Elephants, they will sometimes walk through the fence but it is easily and quickly repaired.

Question No. 17.

Do you know of any cases where fencing has been used and has proved ineffective?

Answer.

Yes, many.

Question No. 18.

If it was ineffective can you say why it was ineffective ?

Answer.

Some of the fences were ridiculously inadequate and put up by people with little knowledge of the habits of Sambhur or of the erection of fences.

Question No. 19.

Do you think that it is impossible to put up an efficient fence ?

Answer.

Not impossible and as a protection against Rusa not uneconomic. For large areas the cost per acre of protection against even Elephants is not high. I worked out one case in which the cost was $2.50 per acre, *i.e.*, $6,250 would have protected an area of 2,500 acres. Fences and trenches must be kept in good repair or their effectiveness is lost. My Sambhur-proof fence cost $3.80 a chain. It consists of *merbau* or *resak* posts 11 feet apart and 4 feet 6 inches out of the ground with 3 foot wire netting of 2 inches mesh with two barbed wires 6 inches apart above the wire netting. The wire netting is 6 inches above the ground so that Pig get under without breaking the fence. Inside the fence is ordinary clean Estate; on the jungle side

there is a strip of at least 4 feet kept clean weeded. I have never seen a Deer jump a fence and I have seen a full-grown Deer, which had been fired at twice and had Dogs after it, on coming up to my fence make no effort to get over or through it but dashed for 200 yards along it until it came to a 2 feet by 2 feet drain which ran under the fence. The Deer scrambled under the fence at this point. I have seen a full-grown Sambhur with its back and belly scored by barbed wire, where he had forced his way through an inefficient fence of approximately 4 feet 6 inches high. The maintenance cost of an efficient fence should not exceed at the most 20 cents per chain per year.

It is as well to emphasize here that the mistaken belief that sambhur will jump almost any fence is based on a lack of knowledge of the habits of this deer.

Sambhur in Malaya, living as they have done for generations in dense and frequently thorny jungle and bush have not developed a jumping habit nor have they much respect for the barbed wire generally used for fencing. A sambhur will always go under or through an obstruction, if such is possible, or in cases where that is not possible it tries to go round. It does not jump over it. The sambhur has developed a technique of getting through practically anywhere so long as it can get its head and forelegs through. Fencing of five or six strands of barbed wire spaced 12 inches apart will not always defeat a sambhur deer; firstly because barbed wire is seldom stretched so tightly that there is no give in it, and secondly because the deer takes little notice of the barbs on the wire, and will force its way through so soon as it gets its head and forefeet through. It will even go down on its knees to get under a fence if it finds there is more room between the bottom strand of wire and the ground than between the wires. The ingenuity of a sambhur in getting through a fence is astonishing, even an unguarded drain passing under a fence will be utilized as a way of entrance or exit. Some understanding of the physical and psychological attributes of the sambhur is necessary if you want to fence against him.

How did the legend of the jumping sambhur arise ? A fence is passed, damage is done to some cultivation inside the fence, the deer has gone. The fence, probably the usual barbed wire fence not too tightly strained, is intact. Therefore the sambhur must have jumped the fence. No expert examination is made to ascertain what actually did happen.

I knew of one case where a fence was to be erected nine feet high of six strands of barbed wire, because, so I was told, sambhur were able to get over nearly nine feet !

I think the person who made this suggestion must have thought that the sambhur was a species of monkey or at any rate a near relation. I am glad to say that I was able to dispel both illusions.

Generally speaking fencing has not been executed throughout Malaya with any great skill; one sees a good deal of barbed wire but little well stretched or carefully erected fencing. To keep out sambhur deer fencing must be well and truly built.

Barbed wire, spaced 12 inches apart, with vertical wires interwoven and locked in position, also 12 inches apart, the whole contraption kept in position by being fastened to stout stakes spaced about 12 feet apart, will keep out any

sambhur. It should be about four feet high; if much lower, although the sambhur will not jump it, they may scramble over it.

Jungle saplings woven vertically through the barbed wire will serve the purpose of the vertical wires but they will not last long and require constant renewals.

But, it is preferable, if a good fence is desired, to erect woven-wire fencing of the " Jay " type. This fencing, of which there are several sizes, is generally sold in rolls of ten chains. The size most suitable for our purpose is 3 feet 10 inches high to 4 feet high, and costs between $50 and $60 a roll F.O.R. Singapore. This would mean under $500 a mile. Pressed M. Steel posts, 9 feet long, can be purchased for $1.25 each, with suitable hooks stamped out of the post to which the wire can be attached; or wooden posts can be used and the fencing attached with galvanised iron staples.

The woven wire fencing is cheap to erect and on this item shows a saving over barbed wire. The woven wire requires to be well stretched and although there are numerous contrivances to do this nothing is more effective or quicker than the well known Trewella Monkey Winch which is in use on so many estates for removing stumps. The wire is clamped between two steel plates and a suitable attachment made to the winch hook.

This woven wire fence, properly erected, is certain to secure immunity from the raids of anything except elephants.

It is important to see that any fence erected with the primary object of securing immunity from the incursions of wild animals should be well upkept. A space of at least 10 to 12 feet should be kept clear on both sides of the fence of all undergrowth, and on the jungle side, if there is a jungle side, of all overhanging branches. Frequently where an estate is fenced close to the jungle edge, large trees will fall on to the fence and bear part of it to the ground. As animals will follow fences for long distances they soon find these openings and then you might as well not have a fence. To repair such damages immediately presupposes a fence patrol and although this seems an obvious precaution to take it is sometimes neglected.

These precautions especially apply to a fence in elephant country. An elephant will often walk along a well upkept fence and then turn back into the jungle because he is aware of the fence and does not naturally want to barge into everything that he comes across which offers an obstruction; whereas he would possibly damage a fence more or less covered with creepers and undergrowth by walking into it because he did not know it was there.

Trenches have been used in some places to check the incursions of elephants. An elephant is supposed to be unable to step over anything that is more than seven feet wide. An elephant cannot jump, so a trench wider than his stride should defeat him. It must be deep enough to prevent him touching the bottom with its trunk. If the trench is allowed to fall into disrepair or undergrowth allowed to grow over it and round it then an elephant will quickly beat down the sides of the trench and make his way across. In hilly country trenches are inadvisable because of the wash and the consequent erosion, also the expense would be prohibitive.

For protecting small areas, isolated buildings for instance, the trench is probably the best arrangement.

Wild animals are suspicious of anything that they know is something which is not natural to their environment, and will, in most cases, avoid it. Elephants will sometimes destroy or damage, what is to them, an unnatural object, but, except in the case of wounded elephants, this is generally the play of the " children " and is not very common.

Many years ago, an estate in Pahang, was much troubled with the raids of elephants, seladang and deer. Many animals were shot but still there was trouble. Finally a Page Woven Wire Fence was erected which proved an effective remedy.

Wounded animals and animals disabled by old wounds are liable at any time to give trouble and cannot be classed as normal or desirable. Unfortunately owing to a mistaken policy of allowing elephants to be fired at by ignorant and ill-armed persons, wounded elephants are far from uncommon in Malaya, and it is generally by such elephants or the fact that a herd contains one or more wounded or disabled elephants that damage is done to fencing and property. There is an old saying in India that " The Elephant never forgets," but unfortunately human beings do and the stupid wounding of elephants still goes on.

Temporary & Seasonal Cultivation

Nearly all Native cultivation other than rubber will come under this heading.

Rice cultivation is the most important but due to poor husbandry in many places rice fields suffer from the depredations of both wild animals and domestic stock. Here again the remedy is adequate fencing which is seldom found in any Native cultivation.

In parts of Pahang where wild pig are numerous a form of bamboo fencing, known as *pagar sasak* is used and is generally efficient when new, but unfortunately maintenance of fencing is not the peasant's strong suit and a bamboo fence without upkeep soon becomes useless. Sambhur deer will be unable to get through or over *pagar sasak* fencing, but deer have a habit of following along a fence and a fence uncared for will have gaps in it somewhere which the deer will soon know of even if the owner does not. I have seen so much of poor and neglected fencing that I doubt if the peasants' cultivation will ever be adequately fenced. Only close inspection will reveal the real cause of damage to crops because such damage is *always* blamed on wild animals if there are any in the district.

I remember a case where an indignant outcry was made because wild elephants were alleged to have destroyed several acres of padi. I investigated this and found that the padi referred to had certainly been destroyed but by kampong buffaloes a herd of which had walked through last year's *pagar sasak* fencing and had eaten up all the padi. Subsequently when there was no padi a herd of elephants had walked through also. This padi was about two miles away from the nearest kampong, quite unguarded, seldom if ever visited, and upkept not at all. Only when the time came for the padi to be approaching ripeness was it discovered that it had been a convenient feeding place for the village buffaloes. Neither the buffaloes nor the padi were looked after !

Where padi land is near a kampong it is generally protected on the village side from buffaloes by not very effective barbed wire fencing, but the jungle side of rice fields or swamps are seldom protected. Sambhur deer are fond of young rice when it is in the grass stage but seldom touch it when it has formed a stalk. They may eat the ripening grain but not often. Sambhur sometimes enter rice swamps after the weeds growing therein, a wild water hyacinth (Eichornea sp.) locally known in Pahang as *keladi itek*, being especially attractive to them. It is difficult to appreciate the fact that despite the known incursions of deer and other animals the peasant is seldom sufficiently interested to fence properly although there is generally an ample supply of fencing material close at hand, and one can only presume that he is quite indifferent to his own welfare.

As I have already pointed out sambhur deer can be readily kept out by a fence sufficiently closely constructed to prevent the animal from getting through it. One could not expect the peasant to afford the initial expense of an efficient wire fence, but all can afford the labour to erect a fence from jungle material which is available in most places where it is necessary to fence against wild animals, and these materials are free of duty to the peasant for his own use.

A wise system of assistance to cultivators by combining the conservation of wild life with the protection of agriculture, as practised elsewhere, would enable a peasant cultivator, where he was seriously embarrassed by the incursions of some species of protected wild animal, to borrow or rent fencing material from the Government; but perhaps that is looking too far ahead for Malaya.

Sakai fencing in bamboo country is sometimes well made, strong and efficient. Whole bamboos are laid one on the top of the other, well lashed together with rattan or strips of bamboo, forming a formidable obstacle to wild animals. Unfortunately Sakai will deliberately leave openings in the fence in which are set, quite illegally, spring bamboo spears (belantek).

He not only kills and wounds many pig, deer and other animals in this way but due to neglect these openings become in time just ordinary gaps in the barrier which let in wild animals to feed on his crops, so that he might just as well not have had a fence at all, except that it was useful to enable him to kill wild life of several sorts.

In dealing with wild animals in relation to agriculture their habits and reactions must be studied and then it is not difficult to find a way to overcome the fact of their incidence.

Few will advocate the extermination of any species. Other means must be adopted to take care of our cultivation, not wholesale slaughter which by its very crudeness admits defeat.

The answer is to fence adequately. This is a provision which should be insisted on, so far as possible, as a condition of occupation when obtaining land for agricultural activities in terrain well stocked with wild life, not only for the benefit of the wild life but for the advantage of the cultivator.

Sunlaws, Pahang,
23rd November, 1938.

REPLANTING AND MALARIA

The Malaria Advisory Board invites the attention of all concerned with the management of estates to the danger of malaria resulting from the replanting of rubber. This danger is greatest in hilly country where the removal of old rubber provides ideal conditions for prolific breeding of *Anopheles maculatus*. Not only is there a great increase in breeding in streams and drains, particularly when these become blocked by trees being felled across them, but pits left by the uprooting of trees, holes prepared for replanting, silt pits and backward sloping terraces may all provide ideal breeding places.

It is suggested that, where possible, streams and drains should be put in order before felling and care taken to avoid blocking the drains by fallen timber. Pits left by the uprooting of old trees should be filled immediately if they are liable to retain water, and holes prepared for replanting should not be left open longer than is absolutely necessary. The Rubber Research Institute advises that: " There is no necessity to leave the holes open for any longer than is necessary to check the actual work of digging them." (The Planter, September 1938). In many places silt pits and terraces are liable to retain water and measures should be taken to enable this to drain off. With the growth of cover plants such breeding places may become obscured, but are still a source of danger.

These measures should not be confined to a half mile radius from human habitations. When intensive breeding is allowed to develop beyond the half mile limit the value of anti-malarial measures in the controlled area may be largely nullified.

Selangor Gardening Society

The members of the Society and their friends visited Mr. Choo Kia Peng's Garden in July and were entertained to Tea.

Mr. E. D. Butler, the President, gave a short talk on the subject of "Some Gardening Difficulties."

In August there was a Circular walk through the Kanching Forest Reserve.

Demonstrations for Kebuns.

Through the courtesy of the Public Gardens Committee arrangements were made for a series of demonstrations in garden practice for the benefit of private gardeners, which were given at the Potting Shed, Public Gardens, Kuala Lumpur.

The demonstrations were given by Mr. Saravanamuthu, the Gardens Assistant, and consisted of a series of eight demonstrations of about one hour each. The course included the following subjects:—

(a) Propagation of plants from seeds, marcots, cuttings, etc. and watering.

(b) Preparation of flower beds:—
  (i) Digging.
  (ii) Manuring.
  (iii) Draining.

(c) Preparation of suitable soils for pot plants, potting methods and general treatment of flowering plants:—
  (i) Flowering Annuals,
  (ii) Flowering Perennials,
  (iii) Ferns,
  (iv) Palms.

(d) Garden pests and diseases, wintering of tubers, and miscellaneous information.

The demonstrations were most successful and 26 kebuns attended the course. It is understood that members and others who sent their kebuns were very pleased with the results obtained.

Singapore Gardening Society.

The meetings of the Society held in the last six months of 1938 were as follows:—

July. Annual General Meeting at Abbotsford, by invitation of Mrs. C. R. Cherry.

August. At Botanic Gardens. Address by Mr. R. E. Holttum on Bougainvilleas. Specimens of 16 different varieties were exhibited.

September. At Tyersall, by kind permission of H.H. The Sultan of Johore. Mr. L. A. Logan Richardson conducted members round the grounds and gardens and demonstrated treatment of trees.

October. At 4 Tanglin Hill, by invitation of Mrs. Tay Lian Teck. Address by Mr. J. C. Nauen on some gardening hints.

November. At Abbotsford, by invitation of Mrs. C. R. Cherry. Address by Mr. J. Fairweather on bee-keeping.

December. At 4 Leonie Hill Road, by invitation of Mr. H. S. Tan, whose large collection of orchids and other plants was shown to members of the Society.

The programme for the first half of 1939 is as follows:—

January 23rd. Visit to Botanic Gardens.

February 27th. Visit to Bukit Azah, Johore Bahru, by invitation of Ungku and Mrs. Aziz.

March 24th, 25th, 26th. Flower Show.

No ordinary meeting of the Society.

April 24th. Discussion on Flower Show at 5 Anderson Road by invitation of Mrs. C. Jackson.

May 22nd. Visit to Gardens at Government House, by kind permission of Lady Thomas.

June 26th. Visit to Buitenzorg, Paterson Road, by invitation of Dr. Hu Tsai Kuen.

Active preparations of the Flower Show to be held March 24th-26th are in hand by a committee appointed by the Society for the purpose. The Hon. Secretary of the Show is Mr. K. J. O'Dell, Municipal Treasurer's Office, from whom further information may be obtained.

THE
M.A.H.A. MAGAZINE

APRIL, 1939.

EDITORIAL

Upon taking over again the task of filling this page it was disappointing to learn that one of our first duties would be to add our apologies to those of Mr. Holttum, expressed in the January issue, for the fact that it was not found possible to publish the October number last year.

Finance is often the stumbling block of small publications of the nature of *The M.A.H.A. Magazine*, and this Magazine is essentially bound up with the finances of the Malayan Agri-Horticultural Association, of which it is primarily the official organ.

There are two ways in which the Magazine can be placed upon a sound financial basis: either by becoming a member of the Association at an annual subscription of $2 which includes the free issue of the Magazine, or by subscriptions to the Magazine only at a cost of $1.20 per annum.

The amount involved by either alternative is negligible-- 10 or 17 cents per month-- but to residents of Malaya we appeal for membership of the Association. Our list of readers outside Malaya is surprisingly large, and it is not reasonable to ask them to take an interest in an Association of which they know little or nothing. But inside Malaya it is a different matter and we feel that all who have the interests of this country at heart should give their support to an Association which has worked steadily since its inception in 1923 for the agricultural development of Malaya and for the encouragement of the small-holder to improve the quality of his crops.

The Malayan Exhibition has been organized annually by the Association at Kuala Lumpur since 1923 with the exception of one year when it was held at Ipoh, and provides an opportunity which would not otherwise occur for the agriculture, trade, and village industries of the country to be displayed in one centre, and thus to be seen collectively by visitors.

The All-Malayan Padi Competition, which has now been held for five years in conjunction with the Malayan Exhibition and is organized by the Department of Agriculture, provides inter-State competition, and is particularly valuable in view of the Department's work on this crop in an endeavour to make Malaya less dependent on foreign sources of supply.

The All-Malayan Small-Holders' Rubber Competition, also held at the Malayan Exhibition, is organized on lines similar to the padi competition, and

gives point to the work of the Rubber Research Institute of Malaya and of the Asiatic Rubber Instructors towards the improvement in quality of the rubber produced by small-holders.

Village Industries have always found in the Exhibition a market, not otherwise obtainable, for their products. Sales at last year's Show reached nearly $6,000, exclusive of orders, and it is safe to assume that only a small portion of this sum would have been expended on the arts and crafts of the country without the facilities provided by the Exhibition.

Small-holder exhibitors are brought from all parts of the Peninsula, and in 1938 over $2,300 was spent by the Association in this manner. Medals and prizes cost over $1,500, and in many villages throughout the country are to be found the bronze, silver, and gold "bintangs" of the Association, proudly displayed by their successful owners.

To suggest, therefore, that "MAHA"—to use its better known title—deserves the support of all residents of Malaya, is not an idle claim. We go further and suggest that it is the duty of good citizens to become members and thus ensure that this organization will be able to continue and develop its good work.

As a practical beginning we ask all business houses and estates to contribute their modest $2 annual subscription. Once they have become members, they could then approach their staffs with a clear conscience.

One last word: we are not asking for something for nothing. Membership entitles the holder to the free issue of this Magazine, to free admission to the Exhibition, and to free advice and help on any subjects coming within the scope of the Association. We are not modest; we consider this Magazine alone is worth the subscription. Admittedly it is largely horticultural, but that section is in the expert hands of Mr. Holttum who has published in it a vast amount of original work on tropical plants not obtainable elsewhere, and few people in Malaya are not interested in gardens. We would willingly increase the scope of the Magazine, but for that we require more readers—and their contributions !

Singapore Flower Show

We offer our congratulations to the Singapore Gardening Society on the very marked success which attended their organization of the annual Flower Show, a report on which appears in this issue. The Society already has a satisfactorily large membership but we imagine that there should have been a marked influx of new members from among the large number of visitors to the Show.

The programme of the Show was an exceptionally attractive production and reflects great credit on its compiler. For the benefit of readers who did not attend the Show we reprint in this issue three articles which appeared in the programme, and the rules for judging which were also included in it. The articles deal with the preparation of exhibits for Shows, and should, therefore, be of particular interest to Selangor readers in view of the forthcoming Flower Show in Kuala Lumpur, to be organized by the Selangor Gardening Society, and in view also of the further Horticultural Show in the annual Malayan Exhibition in Kuala Lumpur in August.

Poultry in Malaya

We are indebted to the Hon'ble the Acting Adviser on Agriculture for permission to reprint two articles included in this issue. In connexion with the article dealing with poultry foods we think it advisable to quote a portion of the editorial of the number of the *Malayan Agricultural Journal* in which this article originally appeared.

> " Given a sound knowledge of the principles of animal nutrition it is a comparatively simple matter to devise rations suitable for poultry in all stages of their development, but the selection of the cheapest ingredients to provide a balanced ration is of first importance if the venture is to prove profitable. Mr. Mann shews which of the foods easily procurable in Malaya may be most profitably employed in this connexion and the article should therefore serve as a useful guide to poultry-keepers.
>
> The reader will recognise that the recommendations given are based on prices current at the time of writing the article. Prices vary according to supply and demand and the choice of ingredients at an economic price may therefore also vary. The publicity given to prices and food value of feeding stuffs may in itself influence market prices. Our readers are invited, therefore, to treat this article as a guide rather than a statement of hard and fast recommendations."

Contributors

We are glad to welcome in this issue further garden notes—from Perak this time—from a new contributor and to express our thanks to him. In actual fact " Kinta Weed " is not a new contributor, as articles, under his more usual name, appeared in the early volumes of *The M.A.H.A. Magazine* prior to its revival in its present form in 1933.

Perhaps other readers will feel encouraged to follow the lead given by our Borneo and Perak contributors. And may we add that articles on subjects other than horticulture, though preferably of Malayan interest, will be equally welcome.

Horticulture.

NOTES ON ROSE GROWING AT CAMERON HIGHLANDS

BY

G. M. Yetts.

Only comparatively few roses can really be said to flourish on the Highlands. The adverse factors which militate against successful culture of the more modern varieties are the heavy rainfall, which tends to make the beds soggy, no matter how carefully prepared they may be, and the absence of a definite dry season which can be taken advantage of to rest the plants by artificial wintering.

Pot cultivation seems to be most suitable for the more delicate varieties, as it is easier to control the drainage by this means.

The only way of resting the plants that I know of is the rather drastic method of lifting them from the ground, drying them for a few days, and then re-planting. I cannot claim to have tried this system out thoroughly, but can state that in some cases such treatment appears to have proved beneficial, whilst in others the reverse has been the case.

Light pruning only is advisable with the newer roses: this can be carried on at intervals throughout the year, and need not be restricted to any particular season.

The chief insect pests are beetles of various sorts, which attack the blooms continually. There seems to be no effective remedy beyond catching them by hand. Various preparations tried either disfigure the foliage or get washed off by rain. Aphis is not very troublesome, and can be easily checked with a nicotine spray. A white scale insect makes its appearance occasionally; kerosene emulsion applied with the aid of an old toothbrush gets rid of this.

Mildew sometimes shows up in dry weather, particularly on new plants. Shirlan, or a solution of medicinal soft soap—which does not burn the young leaves—applied in the evening have proved suitable remedies.

The most showy roses to grow are, of course, the Hybrid Teas, and the Pernetianas, but, generally speaking, they are rather a disappointment. Out of several hundred sorts tried only very few have stood the test of time. Many of them make a wonderful show in their first year, and some carry on for a second year before gradually dwindling away. Very few establish themselves as strong bushes for a longer period.

The older Hybrid Teas undoubtedly have the best constitutions. There is a bush of Mrs. E. Townsend (rosy fawn) in my garden which is now nearly ten feet high, and is continually in bloom. This rose will not be found in any of the English dealers' catalogues, and, so far as I know, can be bought only in India. Judged by modern standards it has little or no form, but it does grow. Amongst the newer Hybrid Teas the following have succeeded best:—

Reds.

Etoile de Holland grows well, and produces a number of blooms at fairly

frequent intervals, but, unfortunately, these turn to an unpleasant magenta colour in a very short time except in periods of dull weather. Joyous Cavalier makes a larger bush than Etoile de Holland, and the blooms are a better colour, but they are a trifle loose and not much good for cutting. Daily Mail Scented is the best all round red, though at times even this rose has a tendency to blue. English growers will not recommend it, but I notice one dealer states that it does well under glass. I have had fairly large bushes of General McArthur, Lady Worthington Evans, and Lady Helen Maglona, but this seems to be exceptional, and in any case the two former have now joined the majority.

Pinks.

Comtesse Vandal, Evert van Dyk, Colombia, Picture, and President Marcia have done as well as any.

Yellows.

Sir Henry Segrave, Lucie Marie, and McGredy's Yellow would appear to be as good as any in this section, but even these are rather disappointing.

Out of the many white Hybrid Teas roses tried the only one to survive is another old rose named Colonel R. S. Williamson.

The only Pernetiana (bi-color) that has done any good with me is a rose named Gaiety. A strong plant I have still got came from Australia some five years ago.

The Teas do well, but there is a tendency for some varieties to ball in damp weather. Mrs. Henry Stevens (white), and Lady Hillingdon (apricot yellow) are outstanding, and succeed well as climbers. Gloire de Dijon seems very subject to Black Spot.

The Hybrid Perpetuals seem to be hardly worth while bothering about. A number of them, such as Hugh Dickson, decline to flower; others do not flower freely, and are apt to ball in the rain. Louise Crette can be very lovely in dry weather. A plant of Mrs. John Laing which I tried became badly afflicted with Black Spot.

The Polyanthas are another disappointment. Like so many of the Hybrid Teas they make a splendid display in the first year, especially in pots, and then go off. The Hybrid Polyanthas succeed better than most in this group. Kirsten Poulsen, Else Poulsen, and Alice Amos are worth trying, but Karen Poulsen, one of the most striking, is a failure. The common pink multiflora rambler grows like a weed, and strikes very easily from cuttings. This rose is employed as a stock for budding by Indian growers, and I myself have used it for this purpose with distinct success.

The China Roses, which are those most commonly grown in the low country, make strong bushes, but there is not much substance in the blooms, and they fare badly in wet weather. Comtesse du Cayla, Fabvier, Laurette de Messimy, and Madame E. Resal are among the best. Climbing Fellemberg is worth growing.

The Noisettes, Cloth of Gold, Maréchal Niel, William Allen Richardson, etc. grow rampantly, and are constantly in flower. During a dry spell they can be delightful, but for the greater part of the year they ball.

The Wichuraianas are not a success. Hybrid Musks have been grown, but those that I have seen were weak, straggly, and not very striking.

RHODODENDRONS IN MALAYA

BY

R. E. HOLTTUM, M.A., F.L.S.,

Director of Gardens, S.S.

In Ridley's Flora of the Malay Peninsula 19 species of Rhododendron are described. These vary in size from small epiphytic plants to large trees. The epiphytic species are not often conspicuous, but one of them, *R. longiflorum*, is found on rocks in the forest at Kanching, near Kuala Lumpur, whence plants have been obtained for cultivation by members of the Selangor Gardening Society. It is on the higher mountain ridges that the larger bushy Rhododendrons occur, and in the neighbourhood of Cameron Highlands they are abundant; these large species are not found in the lower country. Attempts are now being made to cultivate the larger species at the Highlands, and it is hoped that reports on these will be made later in this Magazine. In the present article I propose to deal more particularly with the smaller species, some of which are found wild at low elevations, and with my experience of these; also with some general questions on Rhododendron cultivation and the raising of seedlings.

The Smaller Local Species.

As above remarked, *Rhododendron longiflorum* occurs on the rocks at Kanching, which is at quite a low elevation. It also occurs still on one of the tall trees on Bukit Timah, Singapore. Plants of this species are quite small, usually not more than two feet high. The foliage is also small, the leaves being usually less than 3 inches long, narrow and pointed at both ends. The flowers are borne in clusters of five or more at the ends of the branches. Each flower consists of a narrow tube 2 inches long, the group of free petals at the end of the tube being 1 inch across. The clusters of very dainty orange-scarlet flowers are most attractive, and are produced at fairly frequent intervals in Singapore. The plants need very good drainage, as one would expect in an epiphytic species. The plant which I had under observation in Singapore had plenty of broken bricks in the lower part of the pot, and the soil about the roots was composed of burnt earth, small broken bricks and coarse leaf mould. Exposure to full morning sun seemed beneficial; I do not think the plant would stand sun all day.

R. Teysmannii is a pretty yellow-flowered species with larger leaves than *R. longiflorum*. It is found wild on Penang Hill and would probably grow in the low country. *R. jasminiflorum* is a rather taller species than *R. longiflorum*, with leaves that are round at the base. It has pretty, pure white flowers, and there is a variety slightly flushed with rose pink. This grows quite well on a rock in the garden at " Bel Retiro " on Penang Hill and should also be tried in the low country. There is also another species called *R. orion*, found on Klang Gates, which would be worth trying. All these species would of course need pot culture; they are not true terrestrial plants. They might succeed in a judiciously built rockery, facing east, with shade in the afternoon. As regards manuring of these and other Rhododendrons, I cannot yet make any definite report. They must

undoubtedly be treated with care, and it is quite likely that over-manuring might be fatal. Probably leaf mould and a little phosphate will prove most satisfactory, but diluted liquid from rotten ground-nut cake might be tried.

Rhododendron Brookeanum.

This magnificent species is native in Sarawak. It was named in honour of the first Rajah Brooke, by Mr. Hugh Low (later Sir Hugh) in 1848, and was shortly afterwards cultivated in Europe, and hybridized with other Malayasian species (see below). It is found at elevations of from 1,000 to 7,000 feet, growing as an epiphyte. Last year Mr. O. F. Ricketts of Kuching very kindly sent over a plant to the Botanic Gardens, Singapore. This plant was found at no more than 1,000 feet altitude, on a tree by a river in Sarawak. Mr. Ricketts had it in cultivation for some time at Kuching, where it flowered freely. It was in bud when despatched and flowered beautifully after arrival here. Since arrival, it has made new growth, in spite of the beetles that find it more palatable than local plants, and has produced one new inflorescence.

Mr. Ricketts reports that plants of this species have been found as much as 6 feet high, and says he finds it a good thing to cut them back when they become too tall. They have a foliage quite different in character from that of the smaller epiphytic species mentioned above. The leaves are six inches or more long, thick in texture, with very short thick stalks, and reddish midribs. The inflorescences appear at the ends of the branches, showing first as fat buds covered with pale green bracts, very much reminiscent of the Rhododendrons grown in Europe. The flowers are much larger than those of the Malayan species mentioned, the whole group of ten flowers or more measuring six inches across. Each flower has a wide tube at the base, from the edges of which spring the broad petals. The petals are delicately crisped at the edges, giving a most distinctive and graceful appearance to the flowers. As regards colour, there are several varieties of this species. In the one now growing in Singapore, the flowers open a pale yellow, and gradually develop a beautiful flush of rosy orange outside as they become older. They remain in good condition for a week or more.

Mr. Ricketts has kindly sent a report on his methods of cultivation and treatment of this species. He places the plants in large pots, with a compost of fern root, leaf mould, old (almost rotten) coconut fibre and rotted grass sweepings. He finds that the plants grow well in this compost without any manure. Probably the grass cuttings provide a useful source of nitrogen. The plants are placed facing the morning sun with some light shading, giving mottled sunlight after 9.30 a.m. The plant in Singapore was at first placed in a more exposed position, with full sun until 11 a.m. but the leaves became rather yellow, and the plant improved when given more shade. Mr. Ricketts reports that the plants do not appear to have a regular flowering season at Kuching. They flower three or four times a year.

Rhododendron Brookeanum is a first class flowering plant, and if it will bloom freely and regularly in the lowlands of Malaya, should be a great acquisition to local horticulture. It should also be used in the raising of local hybrids.

Hybrids of Malayan Rhododendrons.

As reported above, *R. Brookeanum* was introduced to Europe about 1850, and subsequently other Malayan Rhododendrons also, including some of those mentioned above. These proved to be satisfactory for temperate greenhouses, and flowered in the winter. Hybrids were soon raised, and a variety of beautiful forms were produced, which are still grown as greenhouse plants. Some of these have lately been brought to Malaya, to Penang Hill and Cameron Highlands. On Penang Hill most of them have not thrived very well, but a few have succeeded and have flowered. Those at Cameron Highlands have grown and flowered well, and indicate that there are considerable possibilities for hybridizing locally. It is obviously better to raise hybrids in Malaya, and select those most suited to local conditions, rather than to import plants from Europe which have been selected to suit quite different conditions. This being the case, a few remarks about the processes of hybridizing in this genus, and on the raising of seedlings, are added here.

Rhododendron Flowers and Their Pollination.

Rhododendron flowers have ten stamens, and a single style with a sticky stigma at its end. The stamens are usually fairly large and easy to handle. The pollen is sticky and the grains adhere together, so that when the anthers are touched a filmy thread of pollen can be drawn away. There are two small round holes at the end of each stamen from which the pollen is extruded. The stamens are ready to shed their pollen immediately the flower opens. The stigma however develops later, and is not ready to receive pollen at this stage; the style continues to grow in length for a few days after the opening of the flower, and only when it is full grown does the stigma become sticky and receptive for pollen.

The treatment of the flowers required for pollination is therefore quite easy. It is usually possible to remove the stamens from a flower immediately it opens without danger of contact between stamens and stigma; but it is safer to open the flower a day earlier and remove the stamens before they have had a chance to shed their pollen. A flower so treated should be covered with paper to prevent pollination until the stigma has matured. Pollen is then taken from the flower to be used as the male parent and transferred to the stigma, which should again be protected for a few days to prevent further pollination.

Fruits are readily set by Rhododendron flowers. They take about 3 months to ripen, when they split open and shed the seeds. They should be picked when the first signs of splitting appear and dried off for a week or so. The seeds are very small (almost as small as orchid seeds) and very numerous.

Seeds and Seedlings.

Seedlings of *Rhododendron longiflorum* are now being raised in Singapore for the first time. As we had no experience of handling the seeds, various methods were tried. The seeds, being very small and light, need careful handling. They are scattered carefully over the surface of the potting material and the pots then covered with glass to keep the seeds moist. The pots are dipped in water occasionally, but not watered from above. As potting materials the following were tried: living moss, sand and peat moss, finely broken bricks, unbroken pieces

of root of bird's nest fern, fern root in small pieces with broken bricks. The sand and peat moss proved least satisfactory. Germination was good on finely broken bricks, but fern root alone or mixed with bricks proved better subsequently. Living moss was not very satisfactory.

The seeds take about 3 weeks to germinate after sowing; in our tests a very high percentage germinated. The tiny root first appears, and penetrates the potting mixture; then the two small green cotyledons expand. The first ordinary leaf begins to grow soon afterwards, and is a little larger than the cotyledons; but even the third leaf is still less than 1/10 inch long. We have transplanted some of the plants, singly into the smallest size of orchid pots at the second leaf stage, and they have continued to grow satisfactorily. The glass cover is removed in the morning soon after germination of the seeds, and the period of exposure gradually increased, until after a month or so the plants are uncovered all the time. They are under the eaves of a house, protected from direct sun and from heavy rain. Watering needs to be done carefully. The fern root mixture which we have found satisfactory (made of small pieces of fresh bird's nest fern root and small broken bricks) holds a good deal of moisture. It should not be kept constantly soaked, but should be allowed to dry out fairly well before adding more water.

One great trouble in the young seedling stage, as with orchid seedlings, is the growth of a film of green algae over the potting material and over the seedlings. This evidently has a smothering effect and is to be avoided. The pots and material should be perfectly fresh and clean to start with, and excessively moist conditions avoided. This delays the development of algae sufficiently to prevent any serious effect if fern root is used as above mentioned. The chief disadvantage of the sand and peat moss mixture is that it seems to encourage the growth of algae.

It is too early to say how soon Rhododendron plants can be raised to a flowering stage; probably three years or more will be required. It has been shown, however, that the growth of seedlings is quite possible under local conditions, and we hope this will lead to the raising and selection of local hybrids. It would be a remarkable achievement if a race of free-flowering Rhododendrons suitable to the equatorial lowlands could be produced; this is now brought one stage nearer to possibility.

NOTES FROM A PERAK GARDEN

The borders have been in full flower now for the last six months, and during the dry season we usually clean them up, cut back the permanent plants, and replant the annuals and short lived things again. We dig them up and mix in all the manure and odd rubbish heap stuff we can get. The little Gomphrena, the " bachelors button " in mauve, purple and white, is always one of our best stand-byes for the border; it goes on " doing its stuff " month after month.

Another border plant, of fairly recent introduction, is Pentas; the red variety is slow and more permanent, but the mauve and white are quick growers, easily propagated from cuttings, and make a good show; they need cutting back occasionally when they get too straggly, but they soon come on again. The very common *Vinca rosea*, the " periwinkle," is always our real stand-by; it flowers month after month, always a mass of flowers, and keeps the border always gay; it seeds freely, and stands cutting back well.

Nothing very interesting in the orchid house just now, but we had a lovely *Vanda tricolor* in flower for over 4 weeks in January. The little Oncidium (from Trinidad) is showing a flower spike; it flowers freely with us, growing in a wooden basket with bits of old tree bark as " compost." But the larger Oncidium—I forget its name—with longer pseudo bulbs will not flower with us at all; I used to see it flowering in the Padre's garden at Taiping. Both varieties have yellow flowers.

We sometimes think that we will give up orchids altogether; they give so little return for the trouble one takes, and flower so rarely. But just when this despair is deepest we suddenly find a *Dendrobium phalaenopsis*, or an Aerides throwing up a flower spike, and again our interest is kindled. We have hopes this year that a *Vanda Lowii* will flower, it is so strong and vigorous, and has sent its roots creeping along the wooden staging of the orchid house. We have heard so much about it with its two terminal flowers different from the others on the flower spike but have never seen one yet in flower.

Among the commoner Malayan orchids, the Scorpions do remarkably well with us. We have some seven or eight posts covered with them, and twice a year have over a hundred sprays of flowers. The Joaquim does not do well here; we never get more than three or four flowers on a spike and they fade too quickly. In Ipoh, much to our envy, we see in Chinese gardens sometimes sprays of twelve or more flowers.

At the moment of writing we have an arch covered with Odontadenia (Dipladenia) in full bloom; there are two varieties, a pale yellow and the commoner saffron coloured variety. Last year they seeded, long fruits 8 inches long, full of long thin seeds, all of which germinated. These Odontadenias are growing on the same arch as a Beaumontia, which is all wrong, but I never have the heart to cut out one or the other. Gardeners need hard hearts, one must'nt be sentimental, (I am not with " poochies " and other " wee beasties ").

Other plants doing their best just now are the Bougainvilleas, the rose, the

common mauve-purples, and Mrs. Butt. The Ipomœa, red (Horsfalliae, I believe) growing over a trellised side of the front porch, never ceases to flower; also Tristellateia with its pretty spikes of yellow flowers with red anthers (described a few months ago in this journal), and, of course, the Hibiscus of all varieties, grown always as standards (marcots, or buddings of this, one of our best Malayan flowering shrubs have been described in earlier numbers of this journal). We have a double yellow that might almost be a Tea rose. We have some 50 pots of *Phlox Drummondii* on a side verandah, a " blaze of colour "—this good old garden expression is now condemned by the best horticultural writers. And we are potting some 60 odd pots of Achimenes; this is one of the very best pot plants for Malaya. The tiny tubers must be dried off for 4 or 5 months, then planted twelve or so to a pot. They will flower for quite 4 months or more. They need light shade. After flowering they should be dried off in the pots and finally collected and stored in a dry cupboard. They increase phenomenally, and from a dozen tubers 5 years ago we have possibly a thousand now. The white variety, though more uncommon, is equally free flowering.

Well, what other news from a Perak garden ? The Frangipani is in full blossom, but has not yet recovered its leaves. The Jacaranda is just starting to shed its foliage, and is already flowering at the tips of the branches.

We also have a strange passion flower, very woody, with large white and purple flowers; sometimes it fruits in hot dry seasons—a delicious fruit, large as a duck egg, pale greenish yellow. But although we fertilize its flowers with a camel hair brush it won't fruit except at its own sweet will.

And here is a tip for planters: old wooden latex tanks discarded in modernization, or too old for service, make wonderful beds for parsley after a few holes have been bored in them for drainage, and placed on posts they serve equally well for lettuce and water-cress.

KINTA WEED.

NEW OR INTERESTING ORNAMENTAL PLANTS

BY

R. E. HOLTTUM, M.A., F.L.S.,

Director of Gardens, S.S.

Gustavia Markgraafiana

The genus Gustavia belongs to the family Lecythidaceae, which also includes the Brazil nut. Linnaeus gave the name in honour of King Gustav III of Sweden, who was a patron of arts and sciences. The genus consists of about thirty species of trees native in South America, most of them having very large and handsome flowers. A few of the species were introduced to Europe during the second half of the 19th century, when the cultivation of plants for the "stove" or warm greenhouse was popular, and these were later sent to the eastern tropics, some reaching Singapore direct from Kew, others *via* Calcutta and Mauritius. None of them are common garden plants in Malaya but all have very handsome flowers and should be better known. It is surprising that none are mentioned in Macmillan's well known book on tropical gardening.

Probably the best species for garden purposes is *G. Markgraafiana*. This reaches a height of about 8 to 10 feet and is a bushy shrub or small tree. It has handsome foliage, the short-stalked leaves being a foot or more long, narrow in the basal part, broadened towards the apex. The flowers also have very short stalks, and are thus seen among the leaf-bases, or sometimes on old branches from which all leaves have fallen. Each flower is about five inches across, has ten to twelve white petals of rather unequal size (as shown in the illustration), and in the centre is a large mass of very numerous stamens, all curving inwards. The stamens are tinged outside with purple, the small anthers being yellow. Within the ring of stamens is the ovary, which has a broad round upper surface. Small bees are frequent visitors to the flowers; they are often completely hidden by the stamens.

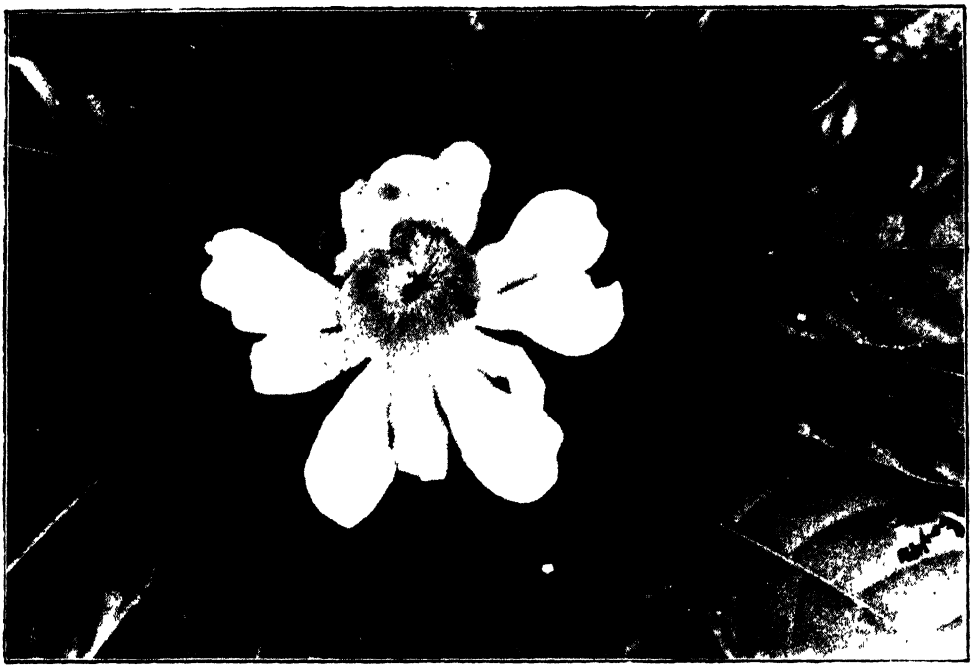
The large and very handsome flowers of this species are borne throughout the year in Singapore, and, though not abundant, make the plant well worth growing for decorative purposes, especially as they are combined with a handsome and distinctive foliage.

The fruits rarely ripen here as they are nearly always damaged by squirrels. Good seeds are, however, sometimes obtained. The plant can be propagated also by marcotting; cuttings are not easy to root.

There is another species, *G. gracillima*, which is taller in growth and less graceful in habit, but has very pretty pink flowers of a similar size and structure. It also is well worth growing as a garden shrub or small tree.

Adenium coetanium

This handsome shrub was mentioned in an earlier issue of this Magazine (Vol. 7 p. 57) but no illustration was published. We can now remedy this omission, but no ordinary photograph can do justice to a plant that has such brilliant colouring. The present illustration will, however, give some idea of the



Gustavia Markgraafiana.

Adenium coetaneum.

Rhododendron Brookeanum.
(*See page 35*).

beautiful shape of the flowers and of the handsome glossy foliage. The colour of the flowers is a most vivid rich crimson pink.

We may repeat here the information that *Adenium coetaneum* is native in Kenya, Uganda and Tanganyika Territory, in arid country from the coast to 3,000 feet altitude. It is surprising that a plant from such environment should tolerate Singapore and also flower freely. It is doubtful however whether *Adenium coetaneum* would grow at all successfully in open ground here, except perhaps in sandy ground near the sea.

The following notes on cultivation and propagation may be helpful to intending growers. The plants should be potted in coarse burnt earth with admixture of a small proportion of leaf mould or other organic matter. Plenty of drainage should be provided. After re potting, the plants should be kept in an airy place sheltered from rain and watered sparingly until new growth begins. Watering should then be increased, and the plants given more exposure, finally to full sun. Plants in active growth will benefit by a fully exposed position and if the soil is well drained will stand ordinary Singapore rainfall. They flower quite frequently.

Propagation is effected by marcotting. The branch to be marcotted should not be too old. Rooting is rather slow, but marcots carefully made rarely fail. A Singapore gardener ties stiff leaves round his marcots to protect the growing roots from the sun and drying winds.

The largest plant so far seen in Singapore is barely two feet high, but quite bushy, with many branches. Such a plant has a main stem three inches or more thick at the base, and takes about three years to develop from a small cutting. There are few more brilliant displays than those given by a good plant of this species, the very appearance of which is strikingly un-Malayan, reminding one of those arid lands of cloudless blue skies where colour contrasts are more frequent than in this green land of ours.

Browallia elata and ***B. speciosa.***

These herbaceous annuals have been grown in Malaya for many years, having been introduced through European nurseries; the species are native in South America and are greenhouse plants in England. We have tried them from time to time in Singapore, but the plants never gave any great show of flowers and we gave them up as regular annuals. Recently however a new strain of *B. elata* has been obtained and proves much more satisfactory than those grown previously. The plants are stronger and flower much more freely; they may also be grown in borders as well as in beds. They produce seeds freely, and plants of successive generations show no falling off in quality.

Browallia speciosa proved formerly less satisfactory in Singapore than *B. elata*, but has been grown regularly on Penang Hill, where it makes a fine show, especially when sheltered from heavy rain. It produces seeds freely, and a number of generations of plants have been raised on Penang Hill. This succession of generations of seeds has perhaps resulted in the selection of plants more suited to our climate. At any rate, a packet of seeds recently brought to Singapore from Penang Hill has produced a crop of very fine plants, flowering freely and well

worth regular cultivation here. The plants have so far only been grown in pots.

Browallia is a genus of the family Solanaceae (the potato family), allied to Salpiglossis and Schizanthus, both of which are well known garden or greenhouse plants in Europe but have not succeeded in the lowland of Malaya. Both *B. speciosa* and *B. elata* are smallish plants, usually not more than 18 inches or so in height. They have a small neat foliage, a bushy habit, and blue or blue-mauve flowers. The flowers of *B. elata* are small, but a good deep violet blue. Those of the *B. speciosa* now in Singapore are rather variable, from a medium blue-mauve to a fairly good violet; the flowers are twice as large as those of *B. elata.*

The seeds of both are very small, about the same size as those of Petunia, and the seedlings are handled in the same way as Petunias. The plants soon flower and remain flowering freely for a few weeks. The only trouble experienced here is that *B. elata* is very subject to attack from a mite that causes severe crinkling of the leaves, making the plants unsightly. This can be controlled by sulphur dusting or by tuba root. The flowers of *B. elata* are also useful for cutting, especially in mixed groups of short flowers, in troughs or rings. Their rich violet-blue colour is distinctive.

THE GIANT SNAIL (*ACHATINA FULICA* FER.) *

TWO CONTAINERS FOR MIXTURES

" Meta " fuel, a proprietary compound metaldehyde, when mixed with rice bran has undoubtedly proved very successful in killing snails and slugs; indeed, the results obtained from its use are most spectacular. The meta mixture is, however, apt to prove expensive as it is readily washed away by rain and is said to be poisonous to poultry and some other animals. These disadvantages may be overcome by covering the mixture with tiles, but the writer in his investigations of *Achatina* has found a cigarette tin and a mushroom type of container more satisfactory.

The Cigarette Tin Container. (Fig. I).

The cigarette tin container based on the design of pill-boxes for ant poisons by Cotton and Ellington† consists of an ordinary 50 cigarette tin measuring about 3 inches in height and 2⅝ inches in diameter. The top is divided into eight equal sections (*i.e.* each is just over 1 inch in width) by making cuts from the rim to a depth of about 1¾ inches. Alternate sections are bent downwards and inwards to provide a smooth surface and the four erect sections are bent slightly outwards to make the lid fit tightly. The tin may be secured to the ground by driving a nail through its base or by driving four sticks placed at equal distances around its base. When the lid is in place the sections are about 1 inch square. The sections should not be larger and the tins should not contain more than 1 oz. of mixture, otherwise poultry will be able to reach it. There is a gradual reduction of the mixture owing to small snails and slugs having to be removed from the tins and to larger snails, which crawl up the sides of the tin and stretch their bodies through the sectional holes, having fed upon it. A cigarette tin of the above design, containing only 1 oz. of bran-meta mixture, has been responsible for the death of 41 snails in one night and of 93 snails throughout a period of two months. A bran-meta mixture will, therefore, prove effective throughout a long period, and will require to be replaced only when the receptacle is empty.

The Mushroom Container. (Fig. II)

The cost of the cigarette tin container is negligible, but the mushroom type may be prohibitive for estate work. The type, as illustrated, was made from tin sheeting for 30 cents by a Chinese tin-smith. A reduction would undoubtedly be made for a larger order. As illustrated, this type consists of two parts, the container (A) and mushroom (B). The container is 3½ inches in diameter and ½ inch in height and has at its centre a piece of circular tubing through which a nail is passed to fix it to the ground. This container is designed to contain 1 oz. of bran-meta mixture.

The mushroom part, which is soldered to a wire frame, is placed centrally over the container, the diameter of the mushroom and frame being 8½ inches. The four stays (D) holding the mushroom to the frame are 1¾ inches in length, thereby

* By G. H. Corbett, B.SC., F.R.E.S., Senior Entomologist, S.S. & F.M.S. *Malayan Agricultural Journal*, Vol. XXVI, No. 9, September, 1938.

† Cotton, R. R. and Ellington, J. W., " A simple and effective ant trap for household use." *Journal Economic Entomology*, Vol. 23, pp. 463—464.

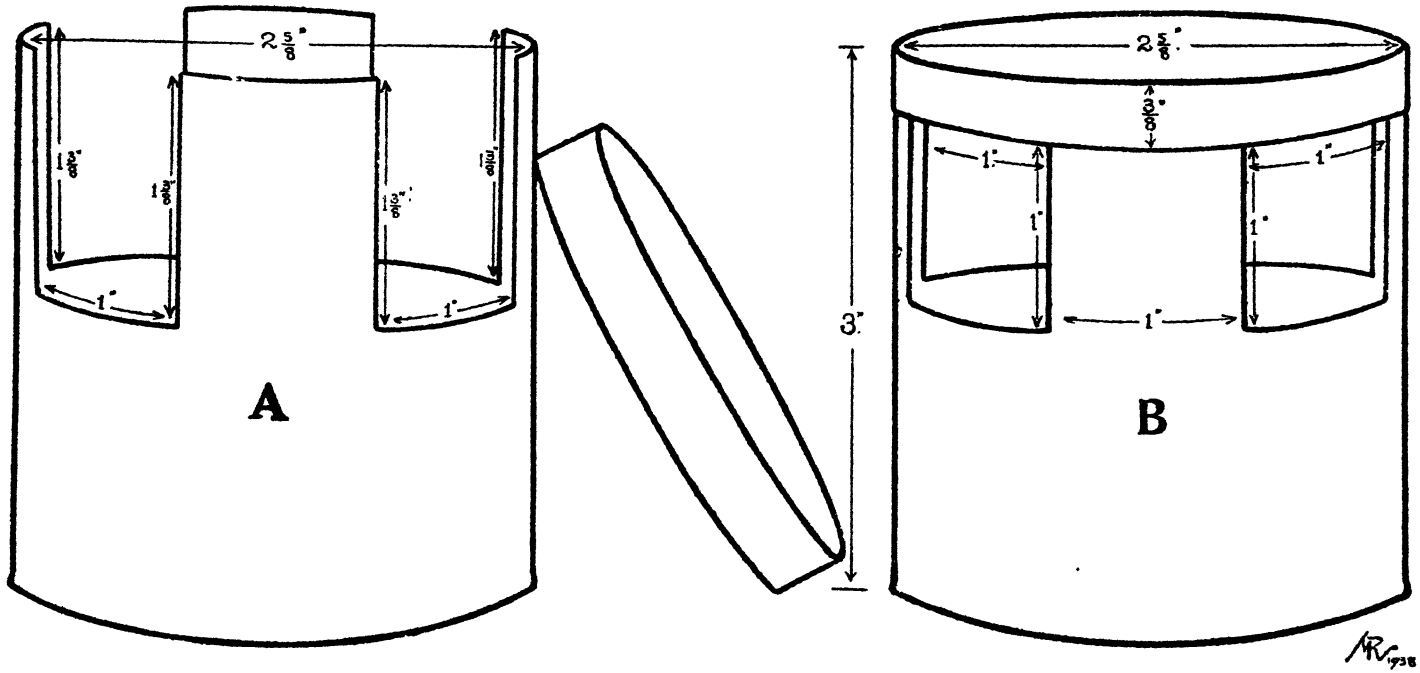


FIGURE I.—A. A Cigarette Tin Illustrating Sections.

B. Assembled for use.

THE MUSHROOM CONTAINER.

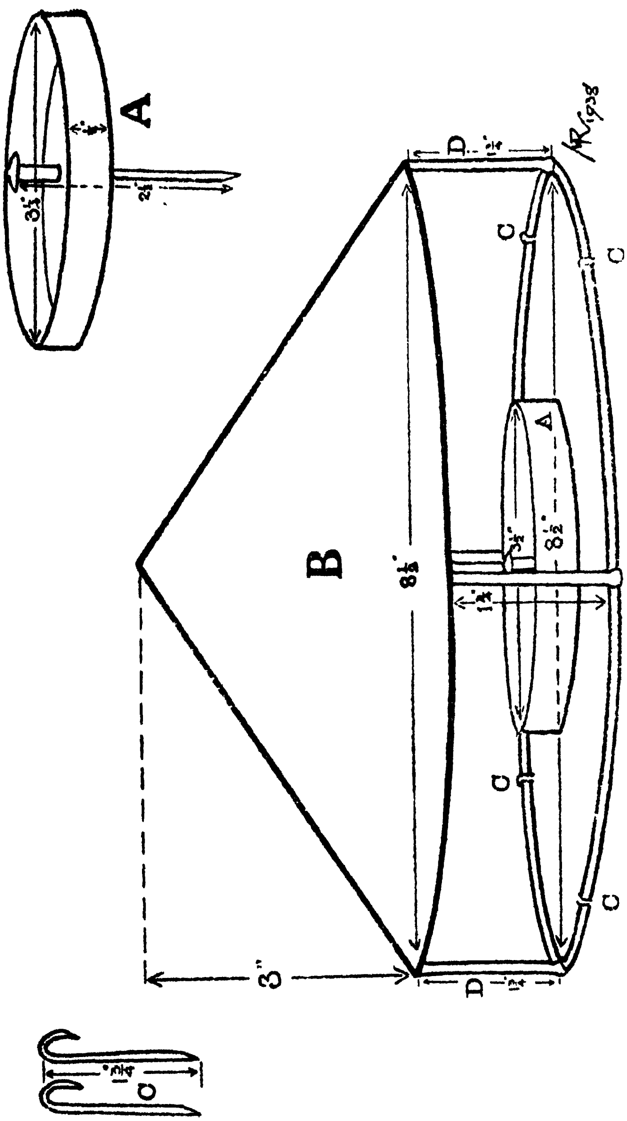


FIGURE II.—A. Container. B. Mushroom. C. Hooks. D. Stays.

allowing just enough space for the entry of larger snails. The apex of the mushroom from its base is 3 inches and the frame is held to the ground by four hook-like pointed wire rods (C). This type of container has proved successful in catching snails and in protecting and in preventing poultry consuming the mixtures.

DAMPING-OFF DISEASE

BY

G. H. SPARE.

Damping-off disease is commonly experienced with seedlings, especially amongst those sown thickly in pots or boxes and grown in heavy shade and under moist conditions. The first sign is the falling over of the seedlings at soil level at certain points after which the disease quickly spreads in ever increasing circles, the seedlings turning brown and then rotting.

Casual Organism. A fungus of the genus Pythium which grows only under moist and close conditions. The hyphae spread from one plant to another until all are destroyed and then continue to live saprophytically. The fungus forms resting spores which can lie dormant in the soil for a very long time in a dry state.

Treatment and Control. Reduce moisture by more careful and less watering; allow the seedlings access to more light and air. Prick out healthy seedlings into fresh sterilized soil. The disease can be checked by immediate watering with Cheshunt Compound (see below), which will prevent spreading but will not save the plants already attacked.

Prevention. Avoid soil in which affected plants were grown. Use sterilized and well drained soil. Sow seeds very thinly and prick out early. After germination harden off to light at an early stage, shading only from strong sunlight. Water carefully and moderately. Water soil, after sowing, with Cheshunt Compound.

Sterilization. Several methods were given on page 101 of *The M.A.H.A. Magazine*, July 1938; of these I have found formalin very effective, but corrosive sublimate is not very readily soluble in water. Baking or steaming soil before use will ensure freedom from many diseases besides "damping-off." Cheshunt Compound is extremely reliable and can be applied at the time of sowing or after the seedlings have germinated without any detriment to the plants. The powder can be bought ready-made or can be easily prepared by well mixing together:

4 oz. copper sulphate finely powdered

1½ lb. ammonium carbonate freshly powdered.

The dry mixture must be stored in airtight glass jars (not tins) as it quickly deteriorates in the presence of air. It should be kept 24 hours after mixing, before use. For use, dissolve 1 oz. of the mixture in a little hot water and add cold water to make 2 gallons; the solution will be a bright blue colour. Water pots and boxes through a rose in the usual way, thoroughly soaking the soil; outdoor beds should be watered at the rate of 1 pint per square foot. Contaminated empty pots or boxes, and the bits of broken pot used to cover the drainage holes, should be washed in the mixture or in a disinfectant such as 2 per cent. Izal, before they are used again.

FLOWER SHOW PREPARATION *

BY

G. H. ADDISON.

A Flower Show is likened to a national sports team in so far as they both are an attempt to bring together the best. A garden requires care and attention at all times and a gardener needs foresight in its preparation. A Flower Show, or more correctly exhibits for a Flower Show, require much more preparation, and the gardener even more foresight. Hard and fast rules regarding this cannot be laid down, as the weather is as reliable as a dollar watch, and requirements of gardeners and plants as varied as the four winds.

One of the most important things to consider is time. It is so much easier to grow a batch of plants to no stipulated day than to grow a good batch to any given time. As a guide for future shows, a list of the commoner plants with approximate periods between sowing and flowering should prove useful. Balsam 65-70 days, Cleome 50-60 days, Celosia 110-120 days, Cockscomb 80-90 days, Dianthus 70-80 days, Gaillardia 70-80 days, Kochia 90-100 days, Petunia 75-80 days, Phlox 70-80 days, Portulaca 50-60 days, Salvia (red) 60-70 days, Sunflower stella 60-70 days, Tithonia 60-70 days, Torenia 55-60 days, Zinnia linearis 60-70 days, Zinnia 50-60 days. This list is based on careful observations, but two or three sowings at 5 or 6 days intervals will help to overcome unforeseen difficulties.

It is possible to regulate the growth of plants to some extent, and a little care exercised at critical periods in the plants' growth will sometimes cause a variation of 5 to 10 days, in the commencement of the flowering period. The growth of such plants as Phlox, Kochia, Balsam, Celosia and others may be regulated to a certain degree by allowing longer intervals to elapse between the application of fertilizers. Dahlias, Zinnias, Petunias, Salvias can be successfully nipped back prior to flowering and so retard the flowering period for a number of days.

From this we find that seeds and cuttings must be planted early as it is an easier process to retard normal growth, than to encourage it, because in this country plants require more applications of fertilizer than in a drier climate. By normal growth is meant the usual supply of fertilizer that one would administer at normal times. Like a number of other things practice brings these processes to a certain state of perfection. One may become perfect in some subjects but no one is ever perfect in horticultural practice.

Staging

When pot plants have been successfully grown, the best can only be obtained at a Flower Show by good staging. This is an important point and such an exhibition can be made something of beauty as well as of interest if this is carefuly watched.

Exhibitors must remember that a large proportion of the public who pay to see the show, only look upon it from the decorative point of view, in fact one

* **Reprinted from the programme of the Singapore Flower Show, 1939.**

could say the majority visit it only because of their appreciation of successful decoration. The wish is to please everyone, and only by good staging can this, if only to a small degree, be achieved.

Staging mainly applies to groups of plants but even a small group of three pots can be appreciably enhanced by a little care. For example covering the pots with a green or black tissue paper or by working some light evergreen foliage in between. In large groups of plants try to prevent flatness but attempt to obtain a certain regularity in the undulations. Mix, if possible, plants of light foliage and try to hide all pots.

Blending of colours is also an important consideration. Try if possible to keep purples away from pinks, rose-reds and blues. To attempt to blend purples with these is disastrous. Purple is a difficult colour to work with and if it must be mixed do so with white and tone it down with light foliage. Pinks, yellows and blues can usually be mixed freely but with pale pinks try to harmonize pale blues, lavenders or yellows. Brilliant scarlets and vermilions are also rather difficult but yellows of certain hues can often be successfully blended. It is worth remembering that if in doubt, use greens or whites as they are the least clashing of colours.

GROWING ORCHIDS FOR THE SHOW*

BY

E. GALISTAN.

Flower Shows, the first of which was held by the Malayan Orchid Society at the Y.M.C.A. Buildings in March 1931, have done much to encourage orchid cultivation, particularly in Singapore. As a result of this encouragement there is a growing interest in this fascinating and interesting hobby, as evident by the larger number of exhibits, of both local and exotic species, seen at the Shows each year. Some of these exhibits are new to Singapore, and quite a number in both categories have reached a high standard of culture. This is evidence of the fact that plants which suit local climatical conditions can be made to grow really well, and even to perfection, when once the essentials of their culture are understood.

Exotic orchids, such as Cattleyas, Oncidiums, and certain species of Dendrobiums, Vandas and Phalaenopsis are, no doubt, very attractive and ideal for Shows. But the uncertainty of the flowering period of these plants, combined with the difficulty of their culture, must necessarily limit the number that will be available for a Show; unless, of course, private collection increases considerably, which appears unlikely for some indefinite time.

This drawback, however, does not apply to some of our free flowering orchids of the outdoor garden variety, such as Vanda Joaquim—our stock plant—*Vanda Hookeriana*, *Archnis alba*—white scorpion orchid—and a few others, the flowers of which can be had all the year round and for which there is a growing market.

The flowers of Vanda Joaquim, and *Arachnis alba*, are, as cut flowers, in a class by themselves, and there is a growing demand for them outside of Singapore. These flowers, which it is hoped will still further improve in quality with keen competition, will continue to be much needed at future Shows as, apart from their interest as local products, they are the only class of flowers that can be had in sufficient amounts to produce a mass effect which is so striking and beautiful that it never fails to attract attention.

Contrary to general belief, however, nearly all the outdoor garden orchids are easy to grow, although comparatively few plants are seen at Shows which approach anything like perfection of growth. As some growers make a speciality of growing outdoor garden orchids, it is proposed in this article to give a few hints which, from practical experience, have been found best suited to grow each class of plant mentioned really well, if not to perfection.

Vanda Joaquim and *Vanda Hookeriana*

The former is essentially a heat loving plant, and needs, among other requirements, full sun in an exposed position, preferably on a hill, if such a situation is available, where there is no shade to deprive the plant of all the sun and air it can get. The next condition the plant requires is sufficient moisture at the roots to balance absorption by the sun. This can be provided by having

* Reprinted from the programme of the Singapore Flower Show, 1939.

the plants grown on a raised bed of burnt earth. Six, or ten at most, cuttings, of one foot in length, is the best size to start a bed of the plants. Tie these plants together and have each lot of six or ten plants, as the case may be, buried about 4 inches in the burnt earth of the bed with a lump of cow dung attached to the base of the plants, to which all the roots are gathered at the same time. When planting has been completed cover the whole bed, leaving the tops of the plants exposed, with grass and dry leaves to prevent undue evaporation of moisture in the bed. Then water the plants lightly, either in the morning or evening, until they have established good growth, say in two or three months' time, when only grass and dry leaves may be added to the bed, with occasional watering and manuring of liquid cow dung. It is most important to keep the bed moist, not damp, at all times, as otherwise the plant soon loses its leaves. The plant should flower in a year's time, and will need, soon after this, a wooden pole to support its weight from bending. After a number of flower spikes the plants begin to thin down when it will be necessary to cut down each clump and replant the tops in a fresh bed. The green stems of the plants should be cut in 6 inch lengths, between the knots, and planted in a nursery for the purpose. When young plants from these stems are about 6 inches or a foot in length they can be planted in a fresh bed and given the attention described above.

Vanda Hookeriana

This plant has a delicate constitution, although it likes a little morning sun only. It should therefore be grown in a position where it is shaded for the rest of the day. The same method of growing Vanda Joaquim will suit this plant very well, except that it needs more moisture at the roots. When the stem and leaves of the plant are yellow it is a sure indication that the plant is too much exposed to the sun.

It should have a light green colour and the stems, when the plant is healthy, should be at least half the size of the stem of a well grown Vanda Joaquim plant.

Scorpion Orchids

(1) *Arachnis alba* (3) *Arachnis Maingayi*

(2) *Arachnis moschifera* (4) *Renanthera Storiei*

(5) *Renanthera coccinea.*

All the above orchids are suitable for growing for the Show, although (1) *Arachnis alba* is the most free flowering of the species. When well grown in suitable positions the rest of the plants are fairly free flowering and, with a collection of any size, it is always likely that some plants will be in flower for the Show.

All these plants, like Vanda Joaquim, need full sun, and thrive particularly well on a hill. *Arachnis alba* may be given the same method of cultivation as Vanda Joaquim. The plants however, will need wooden supports at a fairly early stage of their growth. *Arachnis moschifera* and *A. Maingayi* are very hardy plants and need less attention for their growth. They grow well in a trench in which is filled dry leaves, grass and broken crocks. *Renanthera Storiei* and *R. coccinea* are mostly grown in pots. These plants want well-burnt earth as a potting medium and

good drainage. They thrive well and flower fairly often if given frequent manuring with liquid cow dung or soya bean cake. If grown in the ground, the same method of cultivation as given to Vanda Joaquim will suit them very well.

Spathoglottis

This is also a very fine plant to grow for the Show. Both the hybrid varieties and various species seen at previous Shows grow well in well burnt earth of loose composition. The plants, particularly the hybrids, cannot stand full sun too long and care must be taken to shade them after a few hours morning sun. These plants quickly impoverish the soil in a pot and, to maintain good growth, it is necessary to manure them fairly often with liquid cow dung or soya bean cake.

Arundina

This plant when well grown makes a fine show, as the flowers resemble Cattleyas in miniature.

Not many plants have, however, been seen at the Shows during the last few years and it is difficult to account for it, unless for some reason, it has lost favour with local growers. The Chinese garden flower dealer grows this plant well in well-burnt earth and maintains it in good condition with liquid cow dung and soya bean cake. The plant has vigorous root action and if grown in a pot, soon impoverishes the soil in it and gets pot-bound, when repotting is necessary.

Phaius

Locally called the " moth orchid " this plant when well grown and in flower, makes a fine exhibit at a Show.

The leaves are broad and plicate, and this, with the large chocolate coloured flowers on a tall scape, gives the plant a handsome appearance.

It is quite easy to grow the plant, as all it needs is a loose compost consisting of finely chopped fern roots mixed with leaf mould, dry cow dung, sand and burnt earth. It is a cool growing plant and should be kept in the fern house, and watered sparingly during wet weather. Weevils are particularly fond of this plant, and care must be taken to examine the young leaves of the plant often, as the weevils feed on them and, if not detected in time, will bore into the pseudo-bulbs and eventually kill the plant. It is interesting to record that a large colony of this plant has been found growing splendidly at Cameron Highlands.

PREPARING FOR THE SINGAPORE FLOWER SHOW *

BY

K. J. O'DELL.

Many people who visit the local flower show year by year, go away thinking to themselves that they could plant and raise better flowers than they have seen on show. How few of them ever do anything further about it until the time of the next year's show when it is too late. These notes are written in order that they may be a guide to those who want to show but have never yet tried and also in the hope that more amateurs will come forward and try their luck.

First of all a very exhaustive tour of the show should be made with the catalogue so that the flowers not previously known can be identified and memorised. A very good idea can be obtained during this tour, of the size of pots and general standard of exhibits for which prizes were obtained. The cut flowers and baskets should be examined for size, arrangement and colour scheme and new ideas not yet exploited at the local show visualised.

Then with all this preparatory information obtained from the show go round the garden and see what plants that are contained in the show schedule are already there. Now is the time to prepare the non-annual flowers and ferns in burnt earth with good drainage, in suitably sized pots not forgetting to allow space for their expansion during the year. Miniature gardens should be planted at this time, and it is extraordinarily fascinating to make these from shells, rocks and concrete, then plant them and watch the plants root and grow during the year.

Continual experiments can be made with different seeds, methods of planting, shade and sunlight, etc. for the annuals. Situation has a great deal to do with plant growth and every gardener has a particular fertiliser which he thinks is the best, Chinese bean cake, Municipal dried humus, cow dung, commercial products, etc. This is the time to try them all and keep the results in a diary for future reference. Join the Gardening Society and go to their monthly meetings, see the exhibits brought there, ask questions and hear other people's difficulties solved.

About September the Flower Show schedule is published and exhibitors will then be able to know definitely what flowers are wanted and can then decide what to plant. It will be known after the few months' experimenting what plants grow best and how best to treat them. There will be a financial outlay at this time in pots, fertilisers, seeds, etc. and if non-annuals and ferns etc. are required that are not already in the garden, a visit to the nursery gardeners will be necessary to purchase the small plants that are to be trained and grown. Do not overlook a visit to these gardeners even if it is not desired to purchase plants or cuttings, go and see their flowers and methods of planting. They are most helpful and always pleased to see visitors, who will be very lucky if they manage to leave them without having purchased one of their delightful plants which will catch the eye.

Talk to the kebun, tell him all about the show and get him really interested.

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* **Reprinted from the programme of the Singapore Flower Show, 1939.**

He will respond very quickly and the promise of a portion of the prize money is a sure way of quickening enthusiasm. If it is proposed to show on a big scale a Chinese kebun is undoubtedly the best; they are excellent with pot plants and the nursery gardeners will always put exhibitors in touch with one who is open to engagement for four or five months.

From now on daily interest and work is essential. A walk round the garden morning and evening with the kebun must be made and daily instructions, suggestions and assistance must be given. It is amazing to find that there is something new to be noticed and remedied every day.

As the time for the show approaches visits and talks with other exhibitors are helpful and in addition it is an opportunity to see how their progress compares. Schemes for the baskets and cut flowers should now be decided on having regard to the plants in your garden that are blooming well. The kebun should be instructed to watch carefully for beetles, snails and other pests on the pot plants. Regular spraying with tuba root and half an hour each evening inspecting the plants by torchlight will keep these in check. Group exhibits should be tried out in the garden first for practice.

Send in application forms and arrange for transport with the Flower Show committee. Be at the hall when the plants arrive so that care is taken that they are not damaged in transit or placing. The exhibitor's part is then done and the rest depends on the judges. May their work bring success to the efforts of the new exhibitors.

SOME POINTS ON JUDGING*

The following points on judging have been adapted from a booklet on "Rules for Judging" published by the Royal Horticultural Society, England; their purpose is twofold (1) to assist the judges with their work and (2) to help exhibitors in preparing and displaying their plants.

1. Read carefully the regulations and conditions printed in the schedule and note any peculiar or unusual stipulations.

2. Note the number of competitors in each class and take a general survey of the exhibits.

3. First dismiss from consideration all exhibits which are manifestly inferior. Then compare those which remain. Where the exhibits show no marked difference a point system of judging should be practised.

4. The following point awards are to be adopted.

ORCHIDS

	20 points
Perfection and beauty of blooms	10 points
General condition of plant	6 points
Rarity or difficulty of cultivation	4 points

CUT FLOWERS

(A) Exhibits of one kind	10 points
Perfection of bloom	5 points
Freshness	3 points
Colour	2 points
(B) Mixed flowers	10 points
Effective arrangement	4 points
Perfection of blooms	4 points
Colour and freshness	2 points
(C) Sprays and Wreaths	20 points
General character appropriate for the purpose indicated	5 points
Fresh, well-chosen, unblemished flowers ..	5 points
Pleasing association of flowers with foliage ..	5 points
Colours in harmony with each other and suitability	5 points

POT PLANTS

(A) Flowering	20 points
Display and perfection of bloom	10 points
Health of foliage down to pot	6 points
Freshness	2 points
Inconspicuousness of supports and ties ..	2 points

* **Reprinted from the programme of the Singapore Flower Show, 1939.**

(B) Foliage	.. .. ..	20 points
General condition of cultivation	.. ..	10 points
Perfection of form	.. .. ..	4 points
Difficulty of cultivation	.. .. ..	4 points
Inconspicuousness of supports and ties	..	2 points
GROUPS OF PLANTS		20 points
Artistic arrangement	.. .. ..	8 points
Quality of blooms	.. .. ..	4 points
Perfection of foliage	.. .. ..	3 points
Harmony of colours	.. .. ..	3 points
Excellence in variety	.. .. ..	2 points

5. A new plant should not have extra points merely because it is new but should be judged on its merits.

6. Varieties involving special difficulty in cultivation should be specially considered.

7. Common exhibit defects:—

(A) Immature and faded flowers.
(B) Leafless stems.
(C) Weak and colourless foliage.
(D) Dirty and diseased stems, foliage and flowers.
(E) Conspicuous stakes and ties.
(F) Dirty containers.
(G) Obtrusive pots in group exhibits.
(H) Flatness in outline in group exhibits.
(I) Crowding of plants for "Face" in group exhibits.

Poultry

POULTRY FOODS IN MALAYA: PRICES AND VALUES *

There is everywhere a general tendency to regard individual foodstuffs as cheap or expensive according to their price and without making any detailed enquiry into their intrinsic value as food. Haphazard opinions may or may not be fairly accurate and opinions based on actual food values are obviously to be preferred. Animal nutrition is so complex that values can seldom be determined with complete accuracy but, fortunately, no great degree of accuracy is essential so long as one is not too dogmatic or hasty in drawing conclusions.

Proteins and Energy.

From the nutrition point of view, the intrinsic value of a given foodstuff depends on what it supplies in proteins, minerals, vitamins and energy; while palatability and freedom from substances which may adversely affect the health of an animal or the quality of its produce must also be taken into account. Considered quantitatively, the two most important ingredients are:—

(*a*) proteins—which are required for the renewal of tissues destroyed by the wear and tear of life, for building up new tissues associated with growth, and for the creation of produce such as milk and eggs;

(*b*) energy-producing substances such as carbohydrates and fats—which maintain the body temperature and provide energy for movement.

Not all the proteins and energy so supplied are actually utilized by an animal; a portion, however small, is rejected in the faeces. There are ways, however, of ascertaining with fair accuracy what proportions of protein and energy can be assimilated and the results of such investigations have been recorded, each type of farm animal having its own tables of digestible nutrients. Those employed herein refer only to poultry. Energy may be expressed either as calories (indicating the amount of heat which the material can liberate) or as starch-equivalent (indicating the fat-producing power of the material in comparison with that of an equal weight of pure starch). The latter method is closely related to the former and is adopted in this article, which is inspired by a similar study by E. T. Halnan in England (1).

Basic Values.

Judging from recent statistics, the energy-producing foodstuff which commands the steadiest price in this country is the cereal padi (unhusked rice) the average price of which at the mills in Krian is about $2.00 per pikul (= 150 cents per 100 lbs.). As a correspondingly steady source of proteins, the author has chosen groundnut cake the average price of which (ex mill in Singapore) is about $3.12 per pikul (= 234 cents per 100 lbs.). From these prices and from a knowledge of the average proportions of digestible protein (D.P.) and starch-

* By G. E. Mann, M.C., M.A., Principal, School of Agriculture, Malaya. *Malayan Agricultural Journal*, Vol. XXVI, No. 8, August, 1938.

equivalent (S.E.) which these two foods supply, the price per unit weight of proteins and energy can readily be calculated.

Thus, let 1 lb. of digestible protein cost x cents

and let 1 lb. of starch-equivalent cost y cents.

Then 100 lbs. whole padi, costing 150 cents and supplying on average 6.7 lbs. D.P. and 68 lbs. S.E., cost (6.7x + 68y) cents;

and 100 lbs. groundnut cake, costing 234 cents and supplying on average 38.3 lbs. D.P. and 77 lbs. S.E., cost (38.3x + 77y) cents.

Therefore $6.7y + 68y = 150$

and $38.3x + 77y = 234$

whence $x = 2.1$ and $y = 2.0$

In other words, basing one's judgment on the relatively steady prices and analyses of whole padi and groundnut cake, average prices at the mills are 2.1 cents per lb. for digestible protein and 2.0 cents per lb. for starch-equivalent.†

These unit *prices* may now, for purposes of comparison, be regarded as unit *values* so long as due allowance is made for (a) quality and (b) source of supply.

Quality.

By "quality" is meant in this place not so much freshness and cleanliness as the existence of any special nutritional virtue or objection which a foodstuff may possess. For example, the proteins of milk are of far greater biological value than those of maize. Again, yellow maize is in most circumstances superior to white maize because the former supplies appreciable quantities of the health-promoting vitamin A. White cargo bran and polishings are similarly preferable to the parboiled varieties in that the latter have lost most if not all of their Vitamin B in the process of manufacture. Such advantages and disadvantages must obviously be taken into account when comparing prices although it is seldom possible to value them definitely in terms of money.

Source of Supply.

It has already been stated that the prices of padi and groundnut cake employed in this article are prices at the mills (in Krian and Singapore respectively). Purchasers elsewhere have to pay freight if they obtain their supplies direct from the mills. If, however, it suits their purpose better to buy from a local merchant (as is usually the case when only small quantities are required) the merchant has already paid freight and is entitled to recover it from the buyer. The merchant is also entitled to make a profit on the transaction for he has to provide labour and storage and he runs the risk of loss through depreciation. For poultry foodstuffs in Malaya, a fair average allowance for freight would appear to be about 25 cents per 100 lbs. What constitutes a fair middleman's profit is a more difficult question but 25 per cent. of the cost price, excluding freight, is probably reasonable.

A further allowance for freight ought possibly to be made in the case of foodstuffs such as wheat and fish meal which are imported from overseas. No

† **Corresponding prices in England based on wheat and fish meal, are about 8.5 cents per lb. for digestible protein and 4.5 cents per lb. for starch-equivalent.**

attempt, however, is made to allow for this in the present article. It is assumed for the purposes of this article that it is desirable to encourage the production of as much food as economically possible within the boundaries of this country; and this means that local stock must be fed on locally grown or produced materials of the cheapest nature consonant with efficiency.

Comparative Values of Poultry Foods.

Based on the above considerations, the accompanying table has been constructed to effect a comparison between average prices and values of a number of materials which are or could be employed as poultry foods in Malaya. Allowance has been made for local freight and middlemen's profits wherever the prices quoted are those of merchants, not producers. The most important column for study is column 6 which indicates as a percentage the relationship between prices and values. Figures around 100 indicate that the foodstuff is fairly priced; figures below 100 indicate that it is cheap; figures well above 100 indicate that the foodstuff is expensive when considered solely as a source of proteins and energy.

Discussion.

The basic values employed herein are derived from the prices of locally produced padi and groundnut cake, which have been selected because they are two of the commonest sources of energy and proteins respectively in this country and because their price and composition are reasonably steady.

Among other poultry foods in Malaya, cereals and their by-products may be considered first. It is not surprising to find that the price of wheat and oats is considerably in excess of their intrinsic value as they are imported from abroad and are intended for horses rather than poultry. Oats are claimed to have a special value for horses although it is not known wherein this virtue lies; but this does not apply to poultry and neither wheat nor oats can therefore be recommended for fowls in this country as they are uneconomic. Maize also is mainly an imported foodstuff; its price exceeds its calculated value by some 50 per cent. which cannot be justified by the fact that yellow varieties are a moderately good source of vitamin A. The quality of imported maize is often poor and there would appear to be plenty of scope for extending the production of this very useful foodstuff in Malaya, provided that sales could be effected at about two-thirds of the present price. Broken rice is employed fairly extensively as a poultry food; it sells at slightly more than its calculated value but allowance may be made for the fact that its use obviates to some extent the necessity of crushing or grinding whole padi. It is of particular use in the feeding of young chicks for which whole padi is unsuitable as it is liable to cause digestive disorders. Both polished and parboiled rice appear to be expensive, but it should be remembered that they are essentially articles of human diet and that their price is dependent on that of imported rice. They are seldom purchased as poultry food but, in most households, a certain amount of cooked rice is usually left over after a meal and is often fed to chickens. Rice bran shews a surprising difference between present price and value, even when allowance is made for the fact that the white cargo variety is an important source of vitamin B_1, a deficiency of which leads to nervous disorders, paralysis and

ultimately death. Until about two years ago, white cargo bran ex mill cost only 75 cents a bag instead of $1.25 as at present and at the former price was quite reasonable. Parboiled bran rightly commands a lower price in that its vitamin B content is negligible. White rice polishings, another valuable source of vitamin B_1, might well merit a somewhat higher price than at present if only it were more coarsely ground; most samples are so floury that it is difficult if not impossible to use them in any appreciable proportion without spoiling the texture and hence the palatability of poultry mashes.

Turning to cakes and meals, groundnut cake is not only one of the cheapest but is one of the best protein concentrates available in Malaya and its use as a poultry food might well be considerably extended. It is a constituent of all rations recommended by the School of Agriculture for fowls kept in pens and its use in even larger proportions than that adopted at present may be economically advisable. Definite recommendations on this point, however, must wait until controlled feeding trials have been carried out locally to ascertain how far the proteins of groundnut cake must be balanced by protein of animal origin rather than by mineral substances, for investigations in England and America have led so far to very conflicting results. The use of gingelly and soya bean cakes for poultry cannot be recommended while prices remain at their present levels. The latter is similar to groundnut cake in composition while the former possibly owes its high price to the fact that it is very popular among the Indian cattle-owners in this country. Copra cake, however, sells at somewhat less than its calculated value and more use could probably be made of this material, especially in rations for growing stock and table birds where the proportion of proteins does not need to be so high as in the case of young chicks and laying hens.

Fish meal and whale meat meal, both of which are imported, are expensive. As indicated above, their proteins are possibly of better biological value than those of groundnut cake and fish meal of good quality finds extensive use in poultry foods in temperate countries. In spite of its animal proteins, however, whale meat meal has given very unsatisfactory results with young chicks (2). There would appear to be at least a *prima facie* case for the manufacture of fish and meat meals in Malaya. The author understands that serious obstacles exist at present which would probably prevent the local production of fish meal on any considerable scale, while practical investigations by an ex-student of the School indicate that small-scale efforts could probably not compete with imported material. The possibilities of a local meat meal industry, however, would appear to be more promising, particularly in a densely populated locality like Singapore.

Dried skim milk and unextracted yeast both command large and at first sight exorbitant prices, even when allowance is made for the fact that they have to be imported; but the special virtues of these two foodstuffs, which are closely inter-related, must be taken into consideration. Milk is one of the very few food in the world in which the proteins can be regarded as first-class; its inclusion in rations for baby chicks has a spectacular influence on growth-rate (2) and, in spite of the expense, is justified in the case of good young stock. High levels of protein in the diet of young animals require, however, to be balanced by correspond-

POULTRY FOODSTUFFS IN MALAYA; COMPARATIVE PRICES AND VALUES.

	Item.	(1) D.P. (per cent.)	(2) S.E. (per cent.)	(3) Average Price	(4) Calculated Price per 100 lbs., less freight and middlemen's profit.	(5) Calculated Value per 100 lbs.	(6) Ratio of Price to Value (per cent.)	(7) Remarks re Column (3)
Cereals and By-Products	Rice, unhusked (padi) ..	6.7	68	$ 2.00 per pikul	150 cents	150 cents	100	At Mill, Krian
	„ broken	6.4	87	$ 4.90 „ 170 kati	216 „	187 „	116	Ex „ „
	„ polished ..	7.0	87	$ 6.60 „ 170 kati	292 „	189 „	154	„ „ „
	„ parboiled ..	5.0	87	$ 6.55 „ 170 kati	289 „	184 „	157	„ „ „
	Maize ..	7.0	75	$ 4.50 „ pikul	250 „	165 „	152	„ Merchants, K.L.
	Oats ..	6.7	58	$ 5.00 „ 100 lbs.	380 „	130 „	292	„ „ S'pore
	Wheat ..	11.7	77	$ 8.00 „ pikul	460 „	179 „	257	„ „ K.L.
	Barn, rice, white cargo ..	4.4	29	$ 1.25 „ 75 kati	123 „	67 „	185	„ Mill, Krian
	„ „ parboiled ..	5.3	32	$ 1.05 „ 75 kati	106 „	75 „	141	„ „ „
	Polishings, rice, white cargo	9.2	81	$ 2.35 „ 100 kati	176 „	181 „	97	„ „ „
	„ „ parbiled ..	11.9	88	$ 2.35 „ 100 kati	176 „	201 „	88	„ „ „
Cakes and Meals	Cake, copra, pressed twice ..	13.2	76	$ 2.00 „ pikul	150 „	180 „	83	„ „ K. Selangor
	„ gingelly ..	23.7	67	$ 5.25 „ pikul	295 „	184 „	160	„ Merchants, K.L.
	„ groundnut ..	38.3	77	$ 3.12 „ pikul	234 „	234 „	100	„ Mill S'pore
	„ soya bean ..	34.0	62	$ 5.50 „ pikul	291 „	195 „	149	„ Merchants, S'pore
	Meal, fish ..	50.0	57	$ 9.00 „ pikul	700 „	219 „	320	„ „ S'pore
	„ whale meat ..	43.0	61	$10.00 „ cwt.	694 „	212 „	327	„ „ K.L.
Misc.	Milk, dried skim ..	29.5	75	$22.00 „ cwt.	1551 „	212 „	731	„ „ „
	Yeast, dried unextracted ..	43.7	76	$25.00 „ cwt.	1766 „	244 „	724	„ „
	Gram, green (kachang ijau)	18.2	67	$ 6.00 „ pikul	340 „	172 „	198	„ „

1 kati = 1⅓ lbs. 1 picul = 133⅓ lbs.

ingly high levels of the growth-promoting vitamin B_2 which cannot apparently be secured by the use of bran or polishings. For this reason, a small proportion of dried unextracted yeast is almost invariably included in good chick mashes. There would appear to be no cheap but efficient substitute for these two materials in Malaya, apart from a return to the natural diet which is available under free-range conditions where the risk of disease more than counterbalances the cost of milk and yeast for young chicks of good pedigree.

Finally, the price of green gram—another imported foodstuff—is again too high for the majority of local poultry farmers. It is, in fact, regarded by Malays as a luxury in their own diet and, in spite of its general suitability for inclusion in poultry mashes, it is unlikely to find general favour at its present price.

Summary.

A method of calculating the value of digestible protein and starch-equivalent in poultry foods is described.

Digestible protein is shewn to be worth about 2.1 cents per lb. and starch-equivalent 2.0 cents per lb. Corresponding values in England are about 8.5 and 4.5 cents per lb. respectively.

Average prices and calculated values are tabulated for a number of materials which are or could be fed to poultry in Malaya.

Comparisons drawn between these prices and values lead to the following conclusions:—

(i) the use of imported cereals is uneconomic;

(ii) local extension of the cultivation of yellow maize and the manufacture of meat meal would probably be justified;

(iii) the use in poultry rations of copra cake and particularly of groundnut cake should be extended in order to lower feeding costs; but feeding trials are first required to indicate to what extent a reduction can be made in the use of animal proteins.

Literature Cited.

(1) "How To Cheapen The Ration"—E. T. Halnan, Feathered World Year Book, 1938.

(2) "The Food Requirements of Young Chicks"—G. E. Mann, *Malayan Agricultural Journal*, Vol. XXIV, No. 5.

Reviews

Bulletin of the Colonial Institute of Amsterdam.

Published in collaboration with the Netherlands Pacific Institute, Amsterdam. fl.7.50 or 18 shillings per annum, post free.

We have received for review the February issue of the above Bulletin which is published monthly, and is now in its second year.

The greater part of this publication, 71 pages to be exact, is in English, there being only one article in Dutch. An interesting illustrated article deals with fishing and fish culture in the Netherlands Indies, but the article is confined to a consideration of maritime fishing. Synthetic rubber is discussed in the first instalment of an article entitled " Chemistry threatens Tropical Products," and the possibilities of emigration of Hollanders to Australia and New Zealand are discussed in another article. Other articles deal with Deli, Curacao and the plague problem in the Netherlands Indies.

H. L. B.

The Gardener.

Published quarterly by Pestonjee P. Pocha & Sons, Poona. Price As. 8.

This horticultural quarterly, now in its third year, is published by a firm of seed merchants. It is attractively got up and has numerous illustrations. A long contents page includes articles on the vegetable garden, " How I Did It," the pruning of fruit trees, rose pruning, insectivorous plants, and many other subjects.

H. L. B.

BACK ISSUES OUT OF PRINT.

No. 2 of Volume III (April 1933) and No. 2 of Volume V (April 1935) are out of print, but several subscribers require copies to complete their sets. If there are any readers who have copies of which they are willing to dispose, perhaps they will be good enough to communicate with the editor. One copy of No. 3, Volume I, is also required.

Singapore Gardening Society.

The Singapore Flower Show 1939.

This Show was held on March 24th, 25th and 26th in the Victoria Memorial Hall, Singapore. It is the ninth of an annual series of Shows, the first two of which were for orchids only. Successive Shows have increased in size and in variety of exhibits, and this year's was certainly the largest and best yet held. These annual events have undoubtedly done much to stimulate interest in gardening in Singapore, and to raise the general standard of cultivation. H.E. The Governor, in declaring the Show open, made the following remarks on this subject:

> "It seems to me that during my time here there has been a considerable increase in the variety, and a noticeable improvement in the quality of the flowers and plants that one sees in the gardens and nurseries; and in this development both amateurs and Chinese nursery gardeners have played a noteworthy part. Singapore is becoming very much a city of gardens, a delight both to those who live in it and to those who visit it. The love of flowers never did any one harm, and in these troublous days it is a comfort and a relaxation to get away into one's garden, to gaze at one's small successes, to ponder over the failures, and to plan better for the future. In this we can all learn from one another, whatever our position or race."

The Show was organized by a committee appointed by the Singapore Gardening Society, with the President of the Society as Chairman. The Honorary Secretary and Treasurer of the Committee, Mr. K. J. O'Dell, began his duties last September, devoting a great deal of careful thought and hard work to the many aspects of preliminary organization; the success of the Show was largely due to his efforts. In the later stages he was ably assisted by the Honorary Show Manager, Mr. G. H. Addison. Mr. O'Dell proved also that his gardening skill was as good as his organizing ability, by winning the Championship cup for the highest number of points awarded to any exhibitor. The Committee were also helped by many other persons, harmonious co-operation among whom was one of the outstanding features of the Show.

The schedule of classes for which prizes were offered was divided into the following groups: 1, Orchids (20 classes); 2, Cut Flowers (13 classes); 3, Flowering Plants in Pots (47 classes); 4, Foliage Plants (13 classes); 5, Miniature Gardens and Hanging Baskets (4 classes); 6, Groups of Plants, Amateurs (1 class); 7, Trade Exhibits (2 classes). Entries were received in every class except one and the general standard was very high.

Among the orchids the outstanding exhibits were the groups, of which there were four; the first prize was awarded to Mr. H. S. Tan. The groups were both very varied and also well arranged, and included a number of hybrids of Malaysian orchids. The most interesting individual exhibits were two beautiful new hybrids (*Vanda caerulea* × *tricolor*, and *Dendrobium Phalaenopsis* × *stratiotes*), and magnificent plants of the white *Phalaenopsis amabilis* and the red

Renanthera coccinea, which is surely one of the finest plants for Malayan gardens. As usual, there were good exhibits of Vanda Miss Joaquim and *Arachnis alba*, which are the standard plants in the local cut-flower trade.

The entries for cut flowers were good, but unfortunately the only place available for them was not very satisfactory, and they had lost some of their freshness by the time the public were admitted to the Show. It is hoped to unprove on this arrangement next time. Amateur exhibits were limited to flowers grown by the exhibitor. Among these, a basket of pink Anthuriums grown by Mrs. Tay Lian Teck was awarded the cup. Mrs. C. Jackson exhibited some very charming Antirrhinums; Lady Thomas showed a vase of fine yellow Chrysanthemums, and Lady Small a bowl containing flowers of the buttercup tree (Cochlospermum), most effectively displayed. Among the trade exhibits in this group were some very fine and well-displayed Gladiolus.

Flowering plants in pots occupied the main hall almost entirely, and overflowed into the courtyard. This group has been extended year by year in number of classes, and year by year the size of the pots and of the plants in them has also grown, so that staging has become a problem. The finest exhibits were undoubtedly the Dahlias, which included a great variety of most beautiful shades, and also flowers of remarkable size. The improvement in Dahlias grown in Singapore during the past few years is noteworthy. The Zinnias were also very fine, and added a bright note of colour. The hollyhocks were also excellent, and their production in Singapore is an achievement. The red Salvias were probably the finest ever seen in Singapore. Other classes in which very good plants were exhibited were Verbena, Gladiolus, perennial sunflower, and Hydrangea. The specimen plants of flowering Begonias were of a very high standard. Large Bougainvilleas of several varieties added a very bright touch to one corner of the courtyard. Mrs. Cherry gained the largest number of awards in this group and also the cup for the best individual exhibit (Zinnias).

An indication of the progress of local horticulture is given by a consideration of the number of kinds of plants in this group which had not been introduced to Singapore in 1931, when the present series of Shows started, or were hardly at all grown here. Such a list would include Asystasia, *Beloperone guttata*, several kinds of Bougainvillea, Cuphea, several varieties of Dahlias, Gerbera, Gladiolus, Hollyhock, Kochia, the better varieties of Lantana, perennial Phlox, *Tecomaria capensis*, *Zinnia linearis*. Going back a few more years would eliminate Bougainvillea Mrs. Butt, the perennial sunflower, and Hydrangeas.

Foliage plants were less numerous than in some Shows, but the general standard was high, and the judges found some difficulty in deciding on their awards. Some very beautiful *Adiantum Farleyense*, and some very large and perfectly grown Coleus were the best exhibits. The miniature gardens were well represented, the prize for the larger size being won by a most ingenious production that must have taken a very long time to perfect.

Groups of plants staged by amateurs were more numerous than ever before, and were very effectively displayed on the broad stairs of the hall. The first prize was won by Mrs. Cherry. The groups were all quite different, both in

combination of plants and in arrangement, and judging was difficult. The large groups for trade growers were also well arranged. The first prize in the groups of 120 sq. ft. was won by Nam Kee; in the groups of 80 sq. ft., the exhibit by the Coronation Nursery was judged to be best. It is remarkable how great an improvement has occurred in the arrangement of these groups in the past few years. In the earlier Shows they were just rows of plants. Now the exhibitors show that they have taken much thought to the grouping of their plants, to give both variety and harmony of colour and form.

There were also non-competitive group exhibits from Lady Small, and from the Botanic Gardens. The latter exhibit included a variety of orchids, some of these being new hybrids raised in Singapore and not shown previously; also a fine plant of *Cypripedium philippinense*, which is rarely seen in Singapore.

In addition to the display of plants, for the first time trade exhibits of tools, fertilizers, bulbs and seeds had been arranged, and it is hoped that this feature of the Show will expand in future years.

The Singapore Gardening Society will hold its next meeting on Monday April 27th. This will take the form of a discussion on the Show, and it is hoped suggestions will be received for the improvement of the arrangements, for the guidance of the Committee to be appointed next September to organize the 1940 Show.

R. E. H.

Selangor Gardening Society.

QUARTERLY NOTES

At the annual General Meeting of the Society, held on 22nd February, 1939, the following officers were elected for the ensuing year.

President	–	Mr. C. R. Thurstan
Hon. Treasurer	–	Mr. Eu Kee Eng
Hon. Secretary	–	Mrs. L. R. Kerridge
Committee:		Mesdames H. Fraser, W. G. C. Blunn, Loke Yew, Messrs. L. R. Kerridge, S. C. Colomb, A. Arbuthnott and H. L. Barnett.

At a meeting of the Committee held on the 14th March, Mr. L. R. Kerridge was unanimously elected Vice-President during Mr. Thurstan's absence on leave.

Flower Show. It has been decided to hold a Flower Show on Saturday 3rd June, 1939, which will be staged at the Racecourse, Kuala Lumpur, by the kind permission of the Selangor Turf Club. The following Show Sub-Committee has been elected and will be responsible for the organization of the Show: Mrs. H. Fraser, Mrs. W. G. C. Blunn, Mrs. A. R. Westrop, Messrs. Eu Kee Eng, S. C. Colomb and Chew Sze Foong.

Programme. A programme of talks and visits to gardens is being prepared by the new Committee, but full particulars are not available at the time of writing these notes.

The address of the new Hon. Secretary, Mrs. L. R. Kerridge, is Sungei Way, Selangor.

THE
M.A.H.A. MAGAZINE

JULY, 1939.

EDITORIAL

Once again the Malayan Exhibition is about to open its doors, and this year sees the sixteenth of these Annual Shows. To have maintained this continuity is no mean achievement by its organizers, the Malayan Agri-Horticultural Association, particularly in this land of Malaya which unfortunately is so notorious for flagging enthusiasm and energy.

We think this a fitting opportunity to pay a tribute to Datoh F. W. Douglas, who has been President of the Association since its inception in 1923, and who has again been re-elected President for the current year in spite of his plea that the office should now go to a younger man. It is largely owing to the driving force and unfailing enthusiasm of Datoh Douglas that the unbroken sequence of Shows has been maintained, and the Association is fortunate in having a President who is able and willing to spend considerable time in attending to its affairs.

Even more remarkable is the Association's record when it is remembered what difficulties the Association has experienced in the past in keeping its head above the dark sea of insolvency. As will be seen from the 1938 accounts and report which are published in this issue last year's Exhibition resulted in a loss, and lack of funds made it necessary to withhold publication of the October issue of this Magazine.

The F.M.S. Government has recently very generously made a grant of $10,000 to the Association for the purchase of further permanent buildings, which will thus relieve the Association of the expense of temporary buildings each year for the Exhibition. These new buildings are now being erected and will be in use for this year's Show, improving greatly the lay-out and general appearance of the Exhibition, and providing more satisfactory conditions for visitors.

That Government appreciates the valuable work the Association is doing is made clear by this substantial gift, and we are encouraged by it to refer to our plea in our last editorial for more support for the Association from the general public of Malaya. We repeat that membership subscription is only the small sum of $2 per annum, and it entitles members to free admission to the Malayan Exhibition and to receive this Magazine free of charge: it also enables members to feel that they are assisting a very worthy Association to carry on its work on behalf of Malayan agriculture and handicrafts.

Horticulture.

NEW OR INTERESTING ORNAMENTAL PLANTS

BY

R. E. HOLTTUM, M.A., F.L.S.,

Director of Gardens, S.S.

Mina lobata.

This curious climber grows well on Penang Hill, where it is regularly cultivated, but is little seen elsewhere, though it will grow and flower fairly well even in Singapore. At its best it makes a fine and distinctive display, the change of colour from young to old flowers being very attractive. In foliage it is closely similar to some of the morning-glories, to which it is related, but the shape of the flowers and the way they are produced in erect inflorescence is very different.

The habit of the plant is a slender climber, twining round its support exactly as in morning glory. It is most easily grown in pots, over a bamboo framework, which soon becomes completely hidden by foliage; the flowers then all appear at the top of the plant, as in the illustration. The inflorescences are erect, each with a short slender stalk, above which is a succession of small flowers. The buds at the top of the inflorescence are orange-scarlet; the flowers as they open turn yellow, thus providing a pleasing diversity of colour. Instead of being wide open as in Convolvulus or morning glory, the flowers of *Mina lobata* have a tubular form, somewhat narrowed towards the mouth. The mouth has 5 small teeth, and from it protrude the long stamens and style, nearly as long again as the corolla.

Mina lobata is treated like the annual varieties of morning glory; it is not a permanent woody plant. Grown in a pot, in the usual burnt earth mixture suitable for annuals, it grows well, and as above noted flowers very freely on Penang Hill. Being native of the drier climate of Mexico, it would probably be difficult to manage and less vigorous if planted in the open ground in Malaya. It grows easily from cuttings. Seeds are offered by European seed firms, who class the species as a half-hardy annual.

The photograph here reproduced was taken on Penang Hill, and shows the top of a potted plant, with the foliage making a pleasant pattern, and the numerous inflorescences rising above it. As above noted, the combination of bright red and yellow makes a good show of colour, and the whole effect is something quite unusual.

The Hong Kong Tree-Bauhinia.

Bauhinia is a genus of the family Leguminosae. The native Malayan representatives are all large woody climbers, which often cover the crowns of forest trees with masses of brilliant orange flowers. Further north however there are a number of Bauhinias which are trees or tall shrubs, and some of these are found in Malayan gardens, notably *B. monandra* and *B. purpurea*. The finest of all the tree-Bauhinias is still little known locally, though plants have been in cultivation

Mina lobata

Victoria regia growing with ordinary white water lilies in the Botanic Gardens, Singapore.

in the Botanic Gardens, Singapore, for some years past; it is called *Bauhinia Blakeana*, and is cultivated commonly at Hong Kong. Its origin is unknown.

Bauhinia Blakeana grows into a bushy tree 15 feet or so in height. It has leaves deeply cleft into two halves, each half with a rounded end, much as in the common *B. purpurea*. Its flowers, however, are much more brilliant than those of any allied species, being quite large and of a bright purple colour, the odd petal a more vivid crimson-purple. All the petals have paler veins. The flowers also have a very pleasant perfume.

In Hong Kong, *B. Blakeana* flowers profusely in the cool weather, and all who have seen it report that it is a magnificent sight. In Singapore it flowers more frequently, but never so freely as in Hong Kong; it flowers sufficiently, however, to be well worth growing. Unfortunately it suffers from the attacks of two serious pests, one of which caused so much damage that we formerly thought the species hardly worth growing here.

One pest is the common leaf-eating beetle, that works at night and causes so much havoc with Cannas, roses and many other plants. It disfigures the Bauhinia but does not usually affect its growth seriously. The other pest is more serious, being a small grub that attacks the flower buds, causing nearly all of them to fall prematurely. We have found that a frequent spraying of the young flower buds when they first appear deters the insect from laying its eggs and a considerable proportion of flowers thus survive to maturity. Tuba root or clensel are effective; spraying is done twice a week.

Bauhinia Blakeana never produces any seeds in Singapore. It is propagated by marcots, which root fairly easily. Growth is rapid, if the soil is deep and good, and no special care is necessary apart from treatment for the pests above mentioned. The plant needs a sunny position, away from large trees.

Victoria regia.

Victoria regia, the giant water lily of South America, was first reported by a European explorer in 1828, though it had probably been seen by earlier travellers. It was not until the year 1837 that botanical specimens in a sufficiently good state of preservation for adequate description reached Europe. Dr. John Lindley then described the species as *Victoria regia*, in honour of the young queen who ascended the throne in that year. The specimens he described were obtained by Sir Robert Schomburgk (commemorated by the name Schomburgkia, a genus of orchids) in British Guiana. Sir Robert was then exploring on behalf of the Royal Geographical Society, with the support of the British Government; he first saw the Victoria plants on January 1st, 1837. Sir Robert's original report includes the following passage:

> " There were gigantic leaves, five to six feet across, flat, with a broad rim, lighter green above and vivid crimson below, floating upon the water: while, in character with the wonderful foliage, I saw luxuriant flowers, each consisting of numerous petals, passing, in alternate tints, from pure white to rose and pink. The smooth water was covered with the blossoms, and as I rowed from one to the other, I always found something new to admire. The flower stalk is one inch thick near the calyx and studded with elastic

prickles, about three quarters of an inch long. When expanded, the four-leaved calyx measures a foot in diameter, but is concealed by expansion of the hundred-petaled corolla."

The broad rim of the leaves mentioned above stands vertical, and bears numerous prickles, which are also found on the great veins of the leaf on the underside and on the leaf-stalks. The flowers, which are much like ordinary white water lilies in general aspect, are pure white when they open in the evening; by next morning the centre has turned pink, which colour extends until by the following morning the whole flower is pink, after which it withers. The fruits, covered with formidable thorns, are as big as a man's fist. They ripen below the water, and when ripe appear to rot, the seeds gradually falling to the bottom. The seeds are as big as peas, hard and black when ripe. They are said to provide a useful foodstuff to the natives of the countries where Victoria abounds, just as Lotus seeds are eaten in Asia.

This magnificent species appears to be widely distributed over the greater part of the South American continent, as far as about 15° South latitude. It does not grow in rivers, where the current is too great and there may be considerable rise and fall due to floods, but in back-waters and lagoons where the water level is fairly constant.

In hot-houses in Europe *Victoria regia* plants are treated as annuals. The seeds are sown in the winter, germinating about February or March. The plants reach their full gigantic size by July, and produce good seeds before they die in the late autumn. As may be imagined, liberal supplies of manure are needed to promote this rapid development. In their native home the plants continue to grow throughout the year, and undoubtedly live for several years; they behave also in this way when cultivated in Malaya.

The cultivation of *Victoria regia* in Malaya appears to present no great difficulty. The initial problems of securing seeds and inducing them to germinate probably cause most trouble. Seeds are produced by the plants in Singapore, but we have not yet discovered a method of ensuring germination. The seed coat is very hard, and cutting it with a sharp file often facilitates germination, but does not appear to ensure this. Seeds apparently can live for many months and probably for years in good condition without germinating. Perhaps a certain period of rest is necessary before any growth is possible.

Once germination occurs, the rest is usually easy. The young plant should be kept in a pot submerged two or three inches below the water surface. As new and larger leaves develop, this depth can be increased. When the plant has become too large for its pot, it should be repotted into one of a larger size. When leaves six inches or so in diameter have been formed, the plant can be transferred to its final position.

Only a very large tank, or a pond, can be used for this species, which should have leaves at least 4 feet across, spreading some distance from the centre of the plant; 18 feet diameter of water surface would be a minimum size to allow. The plant needs plenty of room also for its roots, and a rich soil which needs replenishment from time to time. A good way to deal with it is to build up a large square

receptacle of loose bricks from the bottom of the tank, and fill this with earth: or if the plant is to be put into a pond a large basket loosely made of bamboo may be used. The depth of water above the earth surface in which the plant is rooted should be about 2 to 3 feet. A sunny position is essential.

As regards the question of manuring, we have had by far the best results with a complete artificial fertilizer mixed with half-rotted leaf mould. It may be bound difficult to manure the plants below water level. This difficulty may be overcome by wrapping the manure mixture in paper packages or in old sacking, and packing these round the plant. Response to manuring is very rapid, and the rate of growth of the plant when in healthy condition is astonishing. One of the large leaves takes only a few days to expand to its full size from the time it first appears at the surface of the water.

Correlated with this rapidity of growth is the rapid exhaustion of the soil by the plant. Manuring must be repeated at intervals of about 3 or 4 months if full vigour of growth is to be maintained. This indeed is equally true of most water lilies. If manuring is not repeated, or if root development is restricted by confinement within a small space, the plant will continue to live for a considerable period, but its size will be no more than a fraction of what it should attain.

Considering the much greater size of the leaves of Victoria as compared with ordinary water lilies (Nymphaea), the flowers cannot be called gigantic; they are more massive than water lilies but not a great deal larger in diameter. They have however a very pleasant fragrance, unlike the common white and red varieties of *Nymphaea lotus*, which have a slightly unpleasant odour. The blue water lilies (*Nymphaea capensis* etc.) have most delicate perfume.

There is an asiatic water plant the leaves of which are rather like those of Victoria, but its flowers are quite insignificant. This is *Euryale ferox*, native in the plains of India. It is not at present in cultivation in Malaya.

Henna.

The Henna bush (*Lawsonia inermis*) is native in north-west India, and thence westwards to the Mediterranean. Burkill gives the following information as to its history in his *Dictionary*:—

> "In ancient times it was used in Egypt to dye the hands, and seems to have come into great favour, and was used in preparing mummies. Pliny tells us that the port of Canopus, at the western side of the Nile delta, was full of these bushes which scented the town when in flower, and the flowers were used in perfumery.
>
> "The Mahommedans adopted it in India, apparently extending its range; they introduced a name for it as there was no ancient sanskritic name. Laufer suggests that it reached China as a cosmetic in the Sung period (A.D. 960-1276). It cannot have reached the Malay Peninsula at a remote time, and is found only in isolated bushes. There is none of the cultivation by the acre, such as occurs in the Mediterranean and north-western India."

As one would expect in a species native of a climate so different from that of Malaya, Henna does not make a good showing when grown in competition with

local shrubs. It will however grow surprisingly well if it is given satisfactory conditions. It likes a light soil, an exposed place free from other plants, and plenty of manure. It will then grow quite fast, and flower well, making a very pretty bush, and providing a delightful perfume, reminiscent of mignonette. In fact, Henna appears to be called mignonette in some parts of the West Indies.

The leaves of Henna are very small (often less than an inch long), giving the plant at once a distinctive appearance. The flowers are borne in rather large bunches at the ends of the branches. The petals are either creamy white or a pretty deep red colour. Like many other plants of the family Lythraceae (*e.g.* Lagerstroemia and Cuphea) the petals are crinkled. Though the individual flowers are small the bunches are large and quite conspicuous. The red variety is particularly showy. After the flowers, small round fruits as big as peas, each containing a number of small seeds, are produced.

Propagation from seed is the easiest and most usual method. Marcotting of well matured branches is also possible.

If planted as described above, Henna plants thrive well in Malaya, and are especially attractive for their delicate perfume. The chief difficulty in cultivation is attack from scale insects which bring with them the sooty mould which is so disfiguring. The best remedy is spraying with an oil emulsion of some kind.

ROSE GROWING IN SINGAPORE

BY

W. W. JENKINS

The article on rose growing at Cameron Highlands, appearing in the last issue of *The M.A.H.A. Magazine*, has prompted me to write this article in the hope of encouraging people in Singapore to go in for the cultivation of the "Queen of flowers." Having been fairly successful in growing them during the last 3 to 4 years, I have been disappointed to hear people remark that the results of rose growing in Singapore are not worth the trouble involved.

Some people having experimented themselves tell me that after a while the flowers diminish in size, or that flowering ceases altogether. I have only so far had one plant that acted in this manner—a big pinky tea rose—which after flourishing for about 18 months abruptly ceased flowering and merely threw out leaves. I am inclined to think that this was due to my not paying strict attention to the methods I had evolved for the other plants. I do not claim that it is possible to get such a profusion of flowers as is possible in a temperate climate, but with a little extra care it is possible to obtain a regular supply of good flowers, which owing to their fragrance are much superior as a table decoration to the usual type of cut flowers one meets with in Singapore.

I have entirely abandoned cultivation in pots and have all my roses growing in open beds fully exposed to sunlight all day. The soil I have is heavy red and yellow clay with topsoil a few inches deep made from burnt garden refuse. The plants are manured regularly at intervals of about six months with dried and burnt cow manure. Every fortnight all plants have a severe pruning, shoots which have borne flowers being cut right down to the lowest new shoot appearing. The top soil is kept very loose with a fork, particularly after heavy rain and before the sun comes to bake the ground solid. Liberal watering once a day in the late afternoon is all that is necessary.

Like all flowers grown in this country roses are affected by numerous insect pests, but I have found that spraying with tuba root solution keeps most things away. Occasionally "curling disease" will break out on a plant, but this curiously does not seem to affect the flower. Instead of trying to treat this disease in any way I find that it is much easier to prune below the affected area.

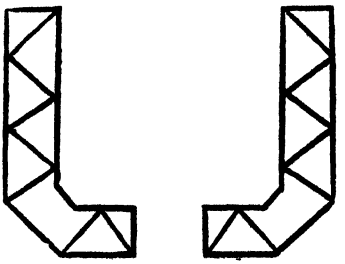
I am unfortunately not able to name the varieties of roses which I am growing as they have all been obtained from Chinese nurserymen. Some I believe actually came from Java. I have, however, seven varieties under cultivation at the moment. A "Dorothy Perkins" will not be trained to climb as at home but its small clusters of pink flowers which appear regularly are effective. There is a pink rose, obtainable at all the nurseries, and perhaps the commonest in Singapore, which appears to be very hardy. Then I have a dark red rose, also very hardy, which usually flowers in clusters of three. There is also a small red rose similar in appearance to the Alexandra rose, but this I do not recommend as its flowers last only for 24 hours. A big white rose gives very good results, as also does a reddish pink one with very narrow petals which curl back for the whole of their

length. Finally there is a tea rose, cream on the inside of the petal and a delicate shade of pink underneath, which is particularly attractive.

I do not claim that there is anything exceptional in the methods of cultivation which I have outlined, but I hope that this article will prompt others interested in the cultivation of flowers to experiment for themselves and that we shall one day in Singapore have rose gardens. I think that the extra care required with roses is well worth while.

HERBACEOUS BORDERS

The chief thing to remember when laying out a herbaceous border is to plan it so that one looks down the length of it. This is more important in Malaya than in England as plants grow irregularly and are often rather scraggy in Malaya. By laying the bed out this way one can keep it looking pretty full for nearly a year as long as one keeps dibbling in seedlings. The bed should be 10 feet wide as this gives about 8 feet for planting in, and I find that the most effective way of planting is in triangles—in beds of an L shape design *viz*:—



The three varieties of bachelor buttons make a good stand-by as they keep flowering for many months. These are also very effective when planted in front of cannas. One can make a very effective herbaceous border of Lantana, as long as one studies the different heights of the various species, rather on the lines of heather beds at home. The advantage of Lantana is that it is constantly in flower and as long as it is kept pruned it will remain bushy and compact. Lantana is not very suitable for a mixed herbaceous border. A good back-ground for a herbaceous border is a trellis covered with Petrea and red Japanese morning glory with one or two Indian laburnums behind that.

H. R. O.

RANDOM NOTES FROM A BORNEO GARDEN

We were all glad to see another number of the magazine, although somewhat on the slim side. The amateur gardeners seem to be rallying round better, and we who call a spade a spade, that is who talk of the Honolulu Creeper instead of *Antignon leptopus*, and " that pretty orange coloured bean flower " instead of *Caesalpinia pulcherrima*, appreciate these articles, although the more technical ones are very good for us.

As usual there are some very fine photographic reproductions, and I understand that is where a good deal of the money goes in producing our magazine.

By the way the last random notes were " lifted " *en bloc* by the *North Borneo Herald* last week, and just as we were preening ourselves a sleepy voice from the depths of a long chair on the verandah spoke. " I say, have you seen the latest copy of the Herald ? Evidently short of material . . . . ." We promptly went into the garden to eat worms !

The latest upheaval is a recent visit to the capital, an attractive coloured little town built 'midst deep green trees on a hill-side with occasional splashes of red galvanized iron roofs, and peeps of scarlet and yellow road trees.

After a very pleasant fortnight in completely new surroundings we returned much refreshed, with a few new plants, a generous supply of orchids given by kind friends shortly going on leave, and last but by no means least, a self-satisfied feeling that this little garden is still one of the prettiest on the East Coast. That is, of course, merely our own opinion. Anyway we did not break any of the ten commandments over the gardens we saw.

The plants which we brought back were a couple of ferns, an ornamental orange and the very attractive *Biota orientalis*.

Some readers may remember that last year I received information that the South African lilies (Chincherinchees) sent to England for Christmas 1937 lasted well into March. Another friend asked for the address last Christmas and I hear that parcel has also lasted well towards March of this year. Should anyone like to have any information about this popular gift I shall be pleased to furnish it.

At Chinese New Year a Fair was held in Sandakan, and from all accounts the Horticultural Section was a great success and well up to the standard of such Shows at Home. I should very much like to have been able to attend, but twenty-two hours by steamer each way is an expensive trip for pleasure alone.

There were some very fine exhibits, from a cos lettuce with a firm heart to an orchid bearing seventy blooms.

One of our latest efforts is the growing of the dainty *Gloriosa rothschildiana*, a climbing lily, scarlet in hue, shading to yellow. This plant is not indigenous to the East Coast, although growing wild and in profusion in some parts of the West Coast. We were naturally very excited to rear one plant to a height of three feet and see it come into bloom. Alas, Nature has won again and after flowering once the plant is dying, although there are still a few promising suckers coming up.

Just one new table decoration before ending these notes. Take a deep and wide cut glass bowl of water and place in it a few whole plants of the water hyacinth

(*Eichhornea crassipes*). They will last only a day but are attractive and cool looking for a luncheon table. The buds, however, open very quickly, so if gathered in the early morning look for those with petals not quite fully opened. These hyancinths are so beautiful with their pale mauve flowers and blue slashed throats that it seems sad they should be considered a " pest " and " obnoxious weed " which unfortunately they are. In Malaya and Borneo they are unromantically grown for feeding pigs, and in the West Indies are fed to donkeys. In Ceylon their culture is now forbidden as they block waterways. They were introduced there in 1905.

D. I.

MIXED BORDERS

BY

G. H. ADDISON,

Botanic Gardens, Singapore.

This is a subject which really requires a book-length article in order to do justice to all the aspects it presents. Various people have a varied number of ideas on how to make and deal with borders, but it is for those people who require the rudimentary knowledge in the making and upkeep of borders that this article is chiefly written.

Preparing the Borders.

An all-important thing to remember when first commencing to make a border is the state and quality of the soil. The all too often case in this country is a poor soil, clay and laterite seeming to be as frequent in Malaya as daisies on an English pasture. On very heavy soils always cultivate the proposed site to a depth of 2½ to 3 feet; if the soil is very bad and in a rather low lying position, dig even deeper and throw most of the clay away. Innumerable times the writer has been asked why such and such a plant is not growing, or why their borders do not fill out more and give a greater wealth of bloom and growth similar to Mrs. So and So's border. The answer is obvious; either the border has never been properly made and the plants are in practically pure clay with about 2 inches of spent black earth on the top, or, less frequently, it has been crying for food for years. The same applies to single specimens; one cannot expect a tree or shrub to grow really well if its first taste of the open ground is in a hole no larger than the pot in which it was previously. One could argue that shrubs grow well in pots when fed, why not with similar root space and food when planted out. The answer is drainage and aeration of the roots.

After cultivating the proposed site to the desired depth, mix in sand, plenty of decayed leaves, rotted grass cuttings and any old rubbish that has been burned in the refuse pit. This is absolutely necessary, especially in a clay soil; the more that is incorporated the better the results. A certain amount of original soil can be mixed in, but the heavier the ground is, the more should be discarded. The borders should then be filled with this mixture to about 6 to 9 in. above the ground level and left for a week or ten days to allow sinking. Before planting, a good dressing of well rotted farmyard manure should be lightly forked in, in order to give the young plants a good start. If farmyard manure is unobtainable, a dressing of artificial fertilizer applied a week or two after planting proves almost as satisfactory. I say almost, because concentrated fertilizers wash out of the soil much more quickly than an organic manure, rendering some of their components valueless.

Sandy soils are quite the reverse of clay soils and are a very desirable acquisition to any garden, unfortunately too infrequently met with in Malaya. Soils of this nature drain very quickly and organic fertilizers are more necessary. Borders in this type of soil are easier to make as a large proportion of the existing

soil may be used to advantage; digging is much easier and it is not necessary to dig so deep. As in clay soils a little farmyard manure should be lightly forked in before planting.

Types of Borders.

Too frequently we meet with the straight edged border running alongside a fence or hedge, the idea seeming to be to retain the outline of the garden lay-out the same inside as outside. On entering, one isn't struck to the same extent with that " delightful little garden " feeling.

When one is planning a border a little originality shown in the design is always an attraction to friends who visit the owners. As an example, a corner is so often kept as a corner even when the border is finished. Why not make the border form a curve inside the corner, and if space is left plant a shrub, so blocking out the bare place ? It may curve inwards or outwards as the designer desires, or take the form of a wavy edge so rendering a more natural effect.

Quite often we find it necessary to build a border perhaps hiding rather an ugly clay bank on which it is difficult to keep a good turf. A good deep trench dug along the bottom, with also an outlet for surplus water, will settle to some extent the drainage question. A fairly wide border made in front of this and planted with tall shrubs at the back, smaller shrubs, herbaceous perennials and annuals at the front, is a very effective method of overcoming difficulties set by a piece of ground such as mentioned above.

Borders with a Hedge as a Background.

If the hedge is composed of a plant of strong growth such as Hibiscus or Anatto, it is advisable to cut a fairly deep trench as near the hedge as safety allows and put in some barrier which the roots of the hedge cannot penetrate. These roots use the goodness in the soil which is so necessary for the weaker growing plants of the border. Filled with clay this trench will quite satisfactorily and economically form the necessary barrier. If one wishes to make something more permanent, a wall of concrete will very effectively keep the roots divided.

Planting

Planting of a newly constructed border should not be considered until it has been allowed to sink for a few days. If planted too early the soil may sink but not the plants and so expose roots near the crown. It may be that the plants sink with the border; more soil is added to fill up the border so causing the plants to be too deep. This may cause rot to start at ground level.

In borders with a steep bank background, a hedge, trellis or some such similar structure, the larger shrubs should be planted at the back. Open borders, when both sides are of equal importance decoratively, require the shrubs planted in the centre. It is also advisable to avoid using shrubs which are of too rapid growth; they are gross feeders and quickly impoverish the soil and fill the border with their roots.

If possible plant after wet weather, but not when the ground is too sodden. Young plants put into a sodden soil so easily rot before root action can begin. On the contrary if the weather is somewhat arid the soil dries out very quickly, unless the watering can is used constantly.

Choice of Plants.

A mixed border in this country is a very different proposition from such a border in a country which possesses two definite seasons, be it winter and summer or wet and dry season. In such a climate as Malaya the idea is to cultivate towards a continual show of bloom and not so much towards a particular flowering period. With this in mind, the woodier plants chosen should be capable of providing this continual blooming. Certain plants lend themselves, but they are somewhat limited in number.

Plants Suitable for a Border.

SHRUBS (FAIRLY DWARF)

Crossandra undulaefolia, (Singapore Geranium): colour orange, continual flowering; slow of growth when first planted, requires shade at the roots.

Lantanas (*mixed colours*): invaluable continual flowering plants which require a light soil and good drainage.

Pentas (*red, white and pink*): the first is the most difficult of the three to grow; needs shade at the crown of the plant and continual spraying against beetles and grasshoppers. (Vol. III, p. 67.).

Galphimia glauca: colour yellow and easy to grow; continual flowering.

Beloperone guttata: produces a continual show of colour; slow when first planted. Shelter the roots. Bracts brick-red, flowers white.

Tecomaria capensis: brilliant orange, flowers well. There are two varieties in this country, one which flowers well and one which does not. When buying, be careful, as they cannot be distinguished morphologically. They require plenty of sun. Green fly seems to be the only pest that worries them.

Plumbago capensis and *rosea*: former blue, latter pink, both flower frequently. Watch the beetles and grasshoppers.

Thunbergia affinis, *T. erecta* and *T. Kirkii*: all need a little shade at the roots when first planted, rather slow to establish.

Clerodendron fallax: similar to *C. paniculatum* but more compact, flowerhead not conical, colour a brilliant scarlet, requires shade at the roots, continual flowering.

Clerodendron macrosiphon: bears long tubular white flowers; very attractive shrub, flowers frequently, compact growth. Should be planted more as it is easy to grow and propagate. (Vol. IX, p. 3 and plate).

LARGE FLOWERING SHRUBS.

Hibiscus Rosa sinensis vars.: there are numerous varieties of these, varying from pale pinks and lemons to oranges and scarlets. They are invaluable plants for the border. Caterpillars and beetles are their biggest trouble.

Cassia auriculata, *C. biflora*, *C. bicapsularis*: all are yellow and fairly continual flowering. Caterpillars are the chief pest. (Vol. V. p. 40).

Euphorbia pulcherrima (*Poinsettia*): there seem to be two varieties of this; one which retains the colour of its bracts almost continually and one which does not. Watch the mealy bug on the flower stalks.

Ixoras: the *coccinea* varieties are probably the most useful for this type of work, varying from yellow to red in colour. *I. javanica* and *I. chinensis*, ochre

yellow and orange respectively, are also invaluable; the latter is troubled by caterpillars which lay their eggs in the young flower-heads, causing them to rot. They should be sprayed frequently.

Jatropha pandurifolia: brilliant red and continual flowering. I consider this one of the best shrubs and should be planted more. The pink variety differs in colour only. They are fairly free from insect pests. (Vol. VIII, p. 3).

Tecoma stans: colour yellow, easy to grow and likes the sun. This is among the best of shrubs if kept free from mealy bugs.

Malvaviscus Conzatii: a colourful shrub flowering almost continually. Beetles and scale insects have a liking for it. Spray frequently. (Vol. VI, p. 96).

Caesalpinia pulcherrima and *var. aurea*: orange and yellow respectively, require periodical hard pruning. Flower well.

Mussaenda erythrophylla: has brilliant red bracts as in Poinsettia. Rather slow to establish itself and requires shade at the roots.

I consider this list of shrubs among the most useful for border planting. Apart from these, Brunfelsias, Gardenias, Russellias, Durantas, Kopsia and Turneras are all worthy of note. Plumerias, Bougainvilleas and Oleanders I consider better planted on their own. Foliage plants are also invaluable for this type of work and good use can be made of the red-leaved Dracaena, Coleus, certain of the Acalyphas and Crotons, the latter requiring shade at the roots when young.

It is not expected to have a show of bloom from the shrubs a month after planting, but it is possible by the use of annuals, to obtain plenty of temporary colour. During the time that the shrubs are growing to flowering size, annuals such Coreopsis, Torenia, Phlox, Cleome, Balsam, Tithonia, Dianthus, Melampodium and others may be advantageously planted. Perhaps two or three sowings would be necessary before the shrubs reached flowering size, but colour would be present.

Herbaceous Plants.

Plants of this nature cannot be left out but they are very limited. Most of them require replanting at intervals and new soil given. If this is not done they quickly deteriorate, mainly because the roots of the shrubs absorb the food more quickly than the roots of the smaller plants, but also because the roots are so near the surface and are unable to reach the food underneath. Some of the best are *Rudbeckia Newmanii*, Angelonia, Helianthus, Michaelmas Daisies, Verbena, *Wedelia biflora*, Ruellia (of sorts), *Tussacia pulchella*, Eranthemum (of sorts), and the various kinds of Zephyranthes.

Upkeep of Borders.

Up till two to three months after planting little need be done except replacing annuals and keeping the weeds clear. After this a system of manuring can with benefit be practised. I suggest a three-monthly manuring programme, once with an artificial fertilizer and once with an organic manure, to be applied alternatively. This should be varied according to the amount of rain which falls during that particular period; the more rain the more frequent the application of manures should be, because the water, as mentioned above, washes the essential

and more soluble chemicals out of the soil. Each time new annuals are planted a little organic manure should be lightly forked into the top 4 or 5 inches of soil.

Pruning of shrubs is also necessary from time to time, but this should be done sparingly. The use of a sharp knife is recommended in preference to secateurs. A knife makes a clean cut but secateurs nip and often bruise the bark and crush the wood at the point of cutting. Rot is liable to start at this place. Try and prevent cutting plants to shape, but prune by the thinning-out method.

Pests are undesirable frequenters which often can do a lot of damage and visit the plants too often. Natural breeding-places are unavoidably made by the grouping of the plants. Scale insects, green flies and mealy bugs can be easily kept in check by periodical spraying with tuba root (Derris), or if the plants are somewhat woody, with Clensel. Beetles and grasshoppers seem to be the worst enemies as they are so difficult to catch. The former usually do the damage at night and the latter are the same colour as the leaves, both having appendages allowing quick self-transportation. Spraying the affected plants with arsenical solution prevents a certain amount of damage, but not all. A periodical spraying with tuba root will keep most undesirable insects at bay.

In hot weather keep the soil loose and, if watering is necessary during the heat of the day, try and prevent it from getting on the leaves, especially the younger ones.

NOTES FROM A PERAK GARDEN

This Perak gardener spent February in Indo-China, and the first thing that strikes a gardener—horticulturally speaking—is the magnificent avenues of shade trees everywhere. Every street, large or small in Saigon, is lined with Tamarind trees planted some 20 to 25 feet apart on both sides of the street. In the greater boulevards there are four lines of trees and a central garden; these trees give a wonderful shade even during the hottest time of the day. In different parts of the city are small public gardens, delightfully cool and green, planted with various shade trees. The private gardens are not as a rule very interesting, the owners usually preferring trees and shade, rather than flowers. In the public gardens just outside the city there is a fine display of flowers planted in long borders and beds—the same varieties as we find in Malaya being used. At the time of our visit the most impressive sight was the Bougainvilleas; they were everywhere, Mrs. Butt mixed with the commoner purple and large flowered mauve varieties. They simply revel in the hot, very dry climate, and were far and away the most striking floral feature of all the public and private gardens we saw in Saigon or elsewhere.

Indo-China is a rice-growing country, with 6 months' dry and 6 months' wet weather and away from the mountains, is flat. There are unending kilometres of rice fields everywhere, and in February, after 4 months of dry weather, they are dry and brown and unattractive. As one goes north-west towards Angkor and the Siamese border one sees fields of maize and tobacco, irrigated with water from the gigantic Mekong River, which rises in the far off mountains of Tibet. Everywhere one sees the Palmyra palm which replaces our more familiar coconut palm in the landscape. At every water hole or pond one sees flocks of storks, herons and pelicans which give interest to a rather dull country side. The villages are dirty and dusty, but a spot of colour to the dull Cambogian scene is given by the numerous Buddhist temples with their gaudy decoration and the numberless Buddhist monks, either begging with their rice bowls in the villages, or sitting in the " Damarsalas " at the side of the road. Half-way to Angkor one passes the capital of Cambodia, Pnom-Penh, and here the gardens have been laid out with especial care; borders possibly half a mile long planted with petunias of every hue and colour set against a background of magnificent trees. During the dry season everything must be watered, otherwise it would be brown and dead; the green lawns and flowers are indeed a sight after the brown landscape.

The really interesting place is Dalat, the hill-station on the Lambian plateau, a plateau as large as an average English county at some 5,000 feet elevation. Here at this time of the year, one has a climate intensely dry, very cold at night, comfortably warm by day. There are miles of open " down " country, alternating with vast pine forests, rolling hills, some covered with forest, others gress. In February they are brown and dry, but, I am told, at other seasons green and sprinkled with wild flowers. It is quite unlike any Malayan hill-station; one can wander at will in the pine woods as at home. The site is comparatively new. The French government have laid out the town and surrounding country with an eye to the future. The streets are planted with Japanese cherry-trees which were

in full bloom when we were there, and Mimosa and other South European trees have been planted. There is a large lake and, in the vicinity, gigantic water-falls which even in the dry season are an impressive sight, one of them being some 300 feet in height. Here the vegetables are perfect, just as in Europe. Areas selected for vegetable gardens are usually in a valley with a small stream running down the centre (even in the dry season there seems plenty of water). The most perfect lettuce—Cos and cabbage types—leeks, artichokes, asparagus, fennel, carrots, peas, and beans, are grown. " Salade de Dalat " is on every menu in Saigon and it is real salad. Every variety of European flower grows there to perfection; the only necessity is water, at least in the dry season. The trees in the woods were covered with orchids, but at this season, not in flower. Dendrobium and Cymbidium seemed to be everywhere but of what variety I could not see.

And now to come off the " horticultural perch " as it were, a few words for intending visitors may not come amiss.

The exchange is very much in our favour, 2 Saigon dollars (Piastres) to $1 Straits. Hotels vary from 5P. to 10 or 12P. ($2½ to $6 Straits). A small beer is 20 cents, a bottle of wine 70 cents to 1P. Saigon is more French than Malaya is English. The shops (at least those in the Rue Catinah, the main fashionable street) are all French; grocers, costumiers, charcuteries, patisseries, cafés, are all run by French people. It is really like walking up a street in Marseilles. At about 11.30 in the morning everything closes down, and all Saigon goes home, or to the restaurant, for déjeuner; the town wakes to life again about 3.30 and goes on until 8 or 9 p.m. At Dalat we were paying at the best hotel 19 piastres a day for two, and food that no hotel in Malaya could even dream of. Our Gallic cousins know how to cook and serve vegetables in a way that makes our usual boiled cabbage and tinned peas look stupid. They cook our local Brinjal in a variety of ways that make it difficult to believe it is the same thing one sees in Malayan markets; and by the way, is it the " superior climate " or what, but their papayas and chikus are so absolutely different to the tasteless things we get served with here. The papayas are small with a very red flesh, and the chikus are large and with a deep purple flesh absolutely delicious; to think of them is to commit the sin of gluttony. I sinned all the time I was in Indo-China; even in the smallest rest-houses one sat down to a banquet *bien arrosé* with good wine.

Everyone speaks French and even the " puss-puss " (richshaw) coolies say " oui," but English is spoken in all the hotels.

The most expensive part of the trip was the train fare on the F.M.S. Railway from Perak to Singapore. Hotels may not be so sumptuous as in Malaya, but they are less than half as expensive, with *cuisine* and drinks at less than a quarter the price (with the exception of a "stengah" which is 1 P. 10 = 55 cents).

Our French neighbours have different colonial ideals than ourselves; they have none of the narrow racial outlook that we have. The French Eurasian has not the inferiority complex we see so often here—he is a French citizen and serves in the French army, and the ladies are as charming as they are beautiful.

But this is not a discussion on colonial policies. The Malayan interested in horticulture or agriculture cannot but profit from seeing the efforts of our neighbours, and, in many ways, I think we have much to learn.

KINTA WEED.

HEDGES

The University of Florida Agricultural Experiment Station has produced a Bulletin (No. 32) on " Ornamental Hedges for Florida," by H. Mowry and R. D. Dickey. Though the State of Florida is entirely outside the tropics, a great many tropical plants flourish in the southern part, and a perusal of this Bulletin provides some interesting information about the behaviour of familiar plants in another climate, as well as suggestions for diversifying the hedges of Malaya. Some fifty different hedge plants are mentioned.

I have many times thought that we in Malaya might attempt more variety in our hedges. The Rev. Keppel Garnier reported some successful experiments with unusual hedge plants in Penang, in a former issue of this Magazine (Vol. IV, p. 210), and these have had some effect, but still the old and well-tried favourites, Hibiscus and bamboo, predominate. It is true that these have many virtues, but variety is pleasant, and those who are making new hedges, and are prepared to take a little trouble to secure and propagate the necessary plants, will be well rewarded if they strike out on a new line—provided of course that they choose a kind of plant suited to their conditions.

The Bulletin mentioned deals not only with the usual formal clipped hedge of medium height but also with dwarf hedges and tall screens, both formal and informal. It contains many useful suggestions as well as a number that are unfortunately unsuited to the Malayan climate (*e.g. Camellias*). It is not possible here to mention all of these, but only to give a general summary; it is hoped that some of the plants may be considered in more detail, and their handling as hedges described, in future issues of this Magazine.

Bougainvillea hedges might well be more common in Malaya. The common small purple *B. glabra* is easy to propagate and makes a very dense low to medium hedge if well trimmed. There are some good examples on Penang Hill. *Carissa carandas* (the Indian relative of *Carissa grandiflora* mentioned in the Bulletin), a thorny shrub of pleasant foliage and flowers, would make a formidable hedge well suited to sandy soil and exposed positions; it will stand trimming. Casuarinas are often trimmed to formal shape, but I have not seen a clipped Casuarina hedge in Malaya. It should be possible to make a fine tall clipped hedge or screen of these trees.

The local wild Cinnamon makes an excellent tall informal hedge or screen, the young foliage being very attractive, but it is rather slow in growth in the early stages. In Florida the allied camphor tree (*C. camphora*) is used, but it is hardly vigorous enough here to be satisfactory except in very good soils. Duranta makes a good informal hedge, but does not stand trimming well, and trimming would spoil its most characteristic feature of drooping clusters of orange berries.

The Surinam cherry or Pitanga (*Eugenia uniflora*) has a pleasant small foliage and grows well in Malaya. In Florida it is trimmed to a formal hedge and could no doubt be similarly used here also.

Various species of privet (Ligustrum) are used as hedge plants in Florida. I only know of one such that grows in Malaya; this is believed to be *L. sinense*,

and makes a tall bush or small tree in Penang. It would doubtless make a good hedge, at least in the north of Malaya, and grows well from cuttings.

The kamuning tree (*Murraya exotica*) is mentioned as good for a tall informal hedge, or for trimming. It could be used also in Malaya but would take a rather long time to establish.

Lantanas all grow well in Malaya, and there are now a great variety of free-flowering forms. These will make a good hedge, but are not so satisfactory for trimming as Hibiscus, do not last so long, and are more subject to pests.

An American species of Myrica (related to the Sweet Gale) is mentioned as useful for formal or informal hedges. Our local species of Myrica, a small tree of exposed places, might well be similarly used, as it has a good bushy habit and pleasant small foliage.

Oleanders are hardly satisfactory enough for hedges in Malaya, except in sandy ground, where they do well. Tea plants would make a good hedge here, as in Florida, and are said to stand trimming well. A Gardenia hedge would also be pleasant, but a little troublesome to maintain free from mealy bugs and sooty mould.

One of the most interesting possibilities is the use of our local Podocarpus (a conifer with something the appearance of a Yew, but with larger leaves). One of the African species has now been grown successfully as a hedge in Penang, and stands trimming. The Florida report states that the Chinese Podocarpus stands trimming well, rather like a Yew hedge, and our local Malayan sea-shore species would no doubt respond in a similar manner. It can be grown from cuttings, though they are slow to strike.

Other interesting possibilities mentioned in the Bulletin are *Vitex agnus castus*, *Schinus terebinthifolius* (the Brazil pepper tree) and *Pittosporum tobira*, all of which have been found to grow quite well in Singapore, but have not been given sufficient trial to be recommended as hedge plants for general use.

There are of course other plants in local cultivation which might be more generally used for hedges, such as Ixora, Barleria, Malpighia, *Excocaria bicolor*, the shrubby Thunbergias etc. In general however they are rather more trouble to maintain than the common Hibiscus, and more trouble to secure in quantity in the first instance. But for those who are prepared to take the trouble, there are great possibilities in these and the other plants mentioned above.

R. E. H.

ORCHID FLOWERS FROM SINGAPORE

Sir Arthur Hill, Director of the Royal Botanic Gardens, Kew, writes:— "I received on Monday, May 1, by air mail from Singapore, a small Bamboo basket, lined with waxed paper, containing cut blooms of *Arachnanthe alba*, *A. Maingayi*, Vanda Hookeriana, V. Miss Joaquim and *V. Cooperi*. There were thirty cut sprays in all. Each bunch had the ends wrapped round with damp cotton-wool, but beyond the waxed-paper lining there was no other packing in the basket. The flowers, when unpacked, were as fresh as if they had only recently been gathered in our own Orchid houses, and they were still in very good condition a week after arrival. I believe this is the first time that an attempt has been made to send cut Orchid flowers by air mail for such a long distance. The package was about eight days in transit. The plants were sent from the Gem Nursery at Singapore and were despatched to me at the request of Mr. J. C. Nauen, a former Kew student gardener, who is now the Assistant Curator of the Botanic Gardens at Penang. Mr. Nauen, who is on leave in this country, tells me that the flowers were sent by way of an experiment to ascertain their hardiness for long air mail transit, and also to test their lasting qualities after receipt. He informs me that hundreds of bunches have been despatched to Calcutta and to Hong Kong by air mail, but this is the first time any have been sent so long a distance as England. I showed the flowers at the Royal Society on May 4, where they were very greatly admired and everyone was astonished to hear where they had come from."

The Gardeners' Chronicle, May 13, 1939.

It is valuable to have evidence from such an authoritative source that orchid flowers from Singapore can arrive in good condition in London; but Sir Arthur Hill is in error when he states that this is the first time flowers have been sent so far by air. Cut orchid flowers have actually been sent frequently to England and other European countries for the past two years, usually in small consignments like those sent to Sir Arthur. The fact that many repeat orders have been given is evidence of satisfactory service.

The time of transit by K.L.M. is usually less than the eight days mentioned by Sir Arthur, and flowers arriving after only 6 days should be in a correspondingly fresher condition. Flowers cannot be sent by Imperial Airways, as transfer from one aircraft to another in India is not permitted. The statement that hundreds of bunches of cut orchid flowers have been sent from Singapore to Calcutta is incorrect, as this is not permitted by the Indian authorities.

If freight costs were less, there would be considerable prospects for development of an export cut flower trade by air from Malaya. As it is, the cost of sending 30 stalks of Arachnis and Vanda flowers to London (including cost of flowers, packing and freight) is about $12, which means that the flowers would not be really cheap, even as orchids. Possibly when the new Dendrobium and Vanda hybrids are really abundant, and air transport still more efficient, there will be a big export of such flowers to Europe; for there is no doubt that the new

hybrids now in process of development will provide a class of flower hitherto unknown, very beautiful and of lasting quality, especially suited to cultivation in Malayan climates, but not well suited to the conditions of European hot-houses.

In the meantime, when we want to send as a remembrance to our friends at home something really Malayan and also beautiful and novel, there is much to be said for choosing a basket of cut flowers of Malayan orchids. Our Vandas and scorpion orchids, though inferior to the new hybrids, are still beautiful, and practically unknown in cultivation in Europe.

R. E. H.

MISCELLANEOUS HORTICULTURAL NOTES

Easy Methods of Propagation.

A great many of the plants found in the average garden are very easy to propagate by seeds, cuttings or marcots; there are, however, others that require a little more attention to ensure success.

One of the most useful additions to a garden is a sand bed. This is simply a frame containing about 6 to 8 inches of sand into which cuttings may be pushed; or even more simply a wooden box half filled with sand.

All that is necessary is to make your cuttings, draw a line 2 to 3 inches deep in the sand, push them in and spray the bed with water. Keep your box or frame shaded from all but the early morning sun. Spray the bed with water once a day.

Plants that may be easily increased in this way are *Tecomaria capensis*, *Duranta macrophylla*, *Odontadenia speciosa*, *Pandorea jasminoides*, *Jasminum Rex*, *Beloperone guttata*, *Lantana* hybrids, *Pentas*, *Coleus*, *Bougainvillea* "Mrs. McLean," "Mrs. Butt," and *glabra* var. *Sanderiana*. The Bougainvillea cuttings should be as thick as possible and be taken from well ripened wood.

For the more difficult plants a little heat is a very great help. In a large garden this could be provided by a glass frame; in a small garden it may be obtained by making use of any glass container that has a lid such as a bell jar, old balance case, or even a wooden box covered by a sheet of glass.

Into this put your cuttings; it is advisable to have the cuttings in small pots. Use a very sandy compost which should not be allowed to get too dry. Keep your glass frame or jar closed for the greater part of the day; it is advisable to open the lid in the early morning for half an hour or so, so as to allow the moisture that has condensed on the glass to dry out. Keep your jar shaded except from the very early morning sun.

Plants that benefit from this treatment are *Bougainvillea glabra* var. *magnifica* (leave one leaf on each cutting), *B. formosa*, *Stephanotis floribunda*, *Rondeletia odorata*, *Ravenia spectabilis;* and it is quite likely to succeed also with many others that are troublesome to root.

Rooting takes place in one to six weeks according to the type of plant.

E. D. H. CRAMER.

Hibiscus Hybrids.

The early history of Hibiscus as a cultivated plant is thus summarized in Burkill's *Dictionary*:—

> **When Europeans first reached the Far East they met with races of it in cultivation of different shades in colour, from pink to white, and then, in China, they met with a yellow-flowered race. In the older Japanese books on flowers, rose, white and yellow races are represented. They had all been isolated long ago, either in the East or in the Pacific: and Fijians, or some other central Pacific people apparently selected out of it *H. storckii*. Europeans, when they had in turn adopted it, crossed it with *H. liliiflorus* (Mauritius), and *H. schizopetalus* (E. Africa), and latterly with some Hawaiian species, obtaining thereby races with very beautiful flowers.**

Double-flowered races had been produced in the East in times sufficiently remote to be quite unrecorded.

In recent years Honolulu has been the chief centre at which new hybrids have been raised, and most of those now cultivated in Malaya have been introduced from Honolulu. The number now existing there is enormous and continually increasing.

The fact that Hibiscus plants do not ordinarily produce seeds in Singapore, combined with the failure of a few experiments in pollination, led to the erroneous conclusion that for climatic reasons the raising of new hybrids is hardly possible here. This conclusion, as shown below, has now been clearly disproved, and there is no reason why we should not emulate Honolulu in the production of new varieties of Hibiscus, though our climate does not appear to be quite ideal for their cultivation.

The stimulus to renewed experiments was the striking success of H.H. Tungku Yacob, who has produced a large number of seedlings at Alor Star, including some fine new varieties. An extensive series of pollinations carried out by various members of the Gardens staff in Singapore in February and March 1939 showed that similar results are possible here.

The conditions necessary for success are that pollination must be done in the early morning, and in dry weather. But even under these conditions only a rather small proportion of pollinations result in fruits being produced. An exact record has not been kept, but it is thought that with the varieties which most easily set seeds about 10 per cent. success is obtained. Among some thirty varieties experimented with in Singapore, twelve have produced seeds.

As all varieties of Hibiscus are hybrids, the offspring of any cross is varied, and the seedlings from seeds out of one pod are quite distinct from the earliest stages.

Efforts are being made, as in Ceylon (Department of Agriculture Bulletin No. 93), to cross various other species with these hybrids. *H. schizopetalus* pollen is effective on several of the hybrids, but success has not been obtained with other species.

This note is published in the hope that other gardeners will try their hand at this interesting work. Pollination of Hibiscus is easy, as the stamens and stigmas are separate and large enough to see and handle easily. Pollination is not laborious work, and the results are quickly seen, as fruits take only 4 or 5 weeks to ripen, and the plants will flower in a few months from planting the seeds.

R. E. HOLTTUM.

Propagation of Cabbages by means of Cuttings.

In Malaya the growing of suitable vegetables provides something of a problem and it is usually found necessary to try out numerous varieties until something suitable is found.

When a variety of a particular vegetable has proved satisfactory, the grower is sometimes extremely disappointed to find, when purchasing the next lot of seed of the same name, that it does not necessarily provide an equally good crop.

On Penang Hill this was the case with cabbages. Some crops were very good but usually their successors from seed of the same name and from the same firm were dismal failure.

This seemed to indicate that the variation was in the seed, and it was decided to try propagation by means of cuttings from plants which had proved successful.

The method is very simple and it has not even been found necessary to strike the cuttings in pots or boxes of specially prepared soil. They are merely planted out in the usual raised beds which are of a light, well drained soil.

When the cabbage is cut for use the old leaves are left on the stem which remains undisturbed in the ground. The bed is treated as for an ordinary crop, kept clean and watered when necessary.

Shoots soon appear in the axils of these old leaves and in about one month's time these will be 4 to 5 inches long when they are at a suitable size to be cut away from the old plant. Quite a large piece of the old stem is cut away with the cuttings to form a large heel. It is from this heel that most of the roots arise. It is not necessary to trim off any of the leaves from the cuttings.

These cuttings are planted out in open beds, inserted 1½ to 2 inches deep and spaced 15 inches apart. They will root in about three weeks and during this period it is better to shade them from bright sunshine.

The crop will reach maturity in from three to four months from the time of taking the cuttings.

A slight variation of the above method is to make two deep cuts at right angles across the top of the old stem and extending downwards about 2 inches. This will divide the top of the stem into four pieces. Fill the spaces thus made with light soil, and by the time the shoots are big enough to be taken from the old plant they will have formed quite a few roots. The rooted pieces are severed from the old plant and lined out in the same way as the cuttings.

Crops have been raised on Penang Hill by these methods for some time and have proved very satisfactory.

J. W. EWART.

Cauliflowers.

On the 16th September, 1938, two varieties of cauliflowers were sown in a garden in Singapore. These two varieties were Early Market and Early Patna which were obtained from Messrs. Sutton and Sons of Calcutta.

In three months time the first head of Early Market was cut, but it was four months before the Early Patna was able to be cut. This first flowering was really quite successful, with Early Market proving itself the better of the two, having more compact heads and a greater percentage of the plants flowering. From the two beds, one of each variety, containing about 24 plants in each, approximately 30 heads were cut. They all ranged from 5 to 8 inches across and on the whole were quite firm.

The biggest trouble seemed to be water hanging on the flower heads and causing a slight surface rot, but this was overcome to a certain extent by covering the beds in wet weather and also every evening in case of rain.

A second sowing was made later in the year but did not prove quite so successful as the first attempt.

As far as can yet be ascertained cauliflowers require plenty of water at the roots and a good supply of manure during the younger stages of growth, with a gradual cuttings off of the manure supply as the flower heads form. They also seem to need plenty of sun; only the high humidity prevents them from being much more successful.

G. H. ADDISON.

Bougainvilleas.

A Method Worth Trying.

An experiment was carried out for limiting the water supply of Bougainvilleas in order to encourage freer flowering and to encourage flowering to some extent at a desired time.

With Bougainvilleas grown in pots the best method according to the writer is as follows. Feed the plants for a few weeks and so stimulate plenty of new growth, on which they will later flower. After sufficient new shoots have been allowed to form, puddle a quantity of clay and spread it over the surface of each pot, about an inch to an inch and a half thick. The clay should be worked well around the stem of the plant to prevent percolation of water, as this seems to be the place where it is least desired. After a month or six weeks the new growth should be sufficiently ripened to permit flowering. After flowering, the clay should be removed and the plants again treated as stated above.

A similar experiment was tried on plants in the open ground and found to be quite successful, only that it was ten weeks after treatment that notable difference was seen.

This latter experiment seems to confirm the view that they must be kept dry at the crown of the plant more than anywhere else.

G. H. ADDISON.

Begonia Semperflorens.

This plant has proved to be one of the best bedding plants in Singapore for a position in the sun.

Some old pot plants were about to be thrown away, or cut down and potted up again. Instead of this, they were planted to replace a half-dead bed of Asystasia plants which were in full sun.

This took place eight months ago, and the bed is as fresh and as floriferous now as it was when it was planted. They have been in flower the whole time and look quite capable of lasting another eight months, weather permitting.

G. H. ADDISON.

Miscellaneous.

IN SEARCH OF CAVES*

Among the Limestone Cliffs of Malaya.

A very noticeable feature of the Malayan scene is the presence of inland cliffs which are scattered all over the country. They are usually called limestone cliffs, and although our geologists probably have a longer and more correct name for them, ending with " ite," I hope the simpler name will be understood !

Most States of the country have them, and most of them have caves, which provide a fine opportunity for exploring. Such exploration is an uncanny business at first and the unexpected is always turning up. A cave may be completely dark, and real darkness is a rare thing to be in: it is usually tempered by moonlight or by some other form of illumination, but in the inner recesses of a cave, there may be nothing to relieve its completeness, except one's torch, *the* most necessary item of equipment. Perhaps there is an inlet for daylight, either in the roof or the wall of the cave, but it is never more than dimly lit and the shaft of light creeping in serves only to deepen the mystery of the scene.

The air is cool and still, as of another world, only disturbed by the ghostly flight of bats and by the plaintive note of a spring of water.

Caves have such an air of tranquillity and peace that no more appropriate places could be found for natural religious edifices, and in fact, the two most important caves in Malaya are temples, those known as Ipoh Caves and Batu Caves.

The name Ipoh Caves is generally used to refer to those caves by the Gopeng Road, and although these are the largest and the most prominent, they are part of a large collection of limestone cliffs which are studded with greater and lesser caves. Those by the road which are utilised as dwellings, and in one case, as a temple, are deservedly famous, and are popular as a place for going and seeing things.

The temple is elaborately developed, with large stone figures looming up in all corners, and long inscriptions in Chinese character covering apparently unscaleable walls. The air is delightfully cool, and the stillness and peace which is the striking feature of all caves, is enhanced here by the human population, Chinese monks and other seekers after Nirvana, whose very bearing suggests tranquillity.

There is a long flight of stairs to explore, and a passage-way leading to an opening in the cliff, which leaves a space open to the daylight, large enough to accommodate a house and garden. This a welcome haven after the dim and almost chilly air of the cave, and so remote from the most main road of all Malaya, although less than 100 yards from it.

Batu Caves is close to the same main road, half a mile therefrom, and six miles from Kuala Lumpur, and, as at Ipoh, the most important cave is a temple, though there are many others in the cliff.

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* By Ralph Wyeth, B. Comm. *St. Andrew's Outlook*, the Record of the Presbyterian Church in Malaya, April, 1939.

Until two or three years ago, one had to climb up to the mouth of the cave, a matter of several hundred feet, over boulders and up slippery earth, but now hundreds of steps have facilitated the ascent. Even so, mounting the whole flight without a stop will make even the fittest breathe heavily, and a pause at the top before going inside, will be welcomed. There is quite a pleasant view through the foliage, across the plain to Kuala Lumpur.

The mouth of the cave is not of the modest kind which hides the inner splendours, but is large and lets in plenty of light. Inside, it is lofty but not possessed of any outstanding natural features. Tucked away at the end opposite the entrance is the Hindu shrine, at which a holy man is seated. Beyond him is a large opening, as at Gopeng, but the space is not used for anything, though another much larger shaft in the cliff mass is used for vegetable gardening.

A second cave, which most visitors look at but into which they do not penetrate as the smell of the multitudes of bats is unpleasant, has only a small entrance and is very dark inside.

There are a dozen or so more caves in this great block of limestone, some as large as the Temple Cave, others with holes over 100 feet deep, and others again, with low ceilings but covering large areas. It is a maze of caves requiring a book to itself.

Thaipusam is the time to see Batu Caves, the haven of all good Hindus in Selangor. Thousands and thousands throng the surroundings below the caves, and live in temporary shelters erected especially for the festival. The side shows, *makan* stalls and the smells, provide an evening's entertainment in themselves, but the most impressive sight is to see the people climbing the steps to the cave above. Many worshippers are old, and some lame, many others are small children and some have to be carried, but all make this journey to the shrine to pay homage in their own way, and to receive a banana and some coconut from the hands of the priest.

In Perlis, there are several caves, and one contains a tin mine. A path starting at Kaki Bukit, enters a natural tunnel which goes through to the other side of the cliff. A boisterous stream uses the same tunnel as the gangway, which has been built over it for the whole length of the cave. There are two waterfalls, which, in the narrow confines of the cave walls, sound like cannon, and often the path is under water just to make progress more thrilling.

Near Lenggong, in Perak, there are caves inhabited by Sakai, in which they have made drawings on the walls, which are as grotesque as one imagines cavemen pictures would be.

On the east side of Malaya's mountain range, which seems to divide the country into two for so many different purposes, there are also inland cliffs, and with caves.

Two interesting outcrops of limestone are visible from the East Coast line between Lipis and Kuala Krai. One near Padang Tengku, 5 miles north of Kuala Lipis, is a quarry which provides stone for the foundation of the permanent way, and is called Gua Seh. This has a natural tunnel passing right through it, but no spectacular offshoots. The second, on the Pahang-Kelantan border, is much

bigger and is skirted by the railway for several miles. By one section of the line, known as the Sakai Causeway, the cliffs tower over the railway and threaten to fall on to it, and the traveller is not advised to try to find the top of the cliff, for his neck is not correctly designed for such a contortionist procedure. There must be lots of caves in this great mass of rock, and I believe it has not yet been thoroughly explored, so here is one opportunity to pioneer, and a useful reminder for the town-dweller who thinks that Malaya is civilised all over.

Among the most interesting caves I have seen are those in Pahang, between Jerantut and Kuantan. Here is a trip for the motorist, for they are close to the Kuantan road, at the 68¼ mile from Kuala Lipis. The path to them is hardly visible at the point where it leaves the road: it is marked by a Malay house, and although that may not usually be a distinctive landmark in a Malay country, it *is* in this part, where all is jungle. There are practically no houses along the 70 miles from the Jerantut ferry over the Pahang River, to Gambang, 30 miles from Kuantan.

The caves are very little known and are in too remote a part to be overrun by tourists. The Sultan of Pahang was there a few months ago, and some of the steps and rentases cut for his benefit are still there to assist finding the way about.

Malays tell a story about a raja who lived here with a fair daughter who was carried away by a lover when she was about to be betrothed to a rival swain. This caused inter-tribal warfare such as this region no longer knows, and the only inhabitants there now are harmless Sakai, who take shelter in the various "kota-kota."

The path from the road first crosses a patch of native rubber, then into squashy jungle, arriving at a low archway of stone after about half a mile. This is called Kota Tongkat, which is the entrance to the block of caves a little farther along. The arch is supported by natural pillars, and the walls are decorated irregularly by lesser protuberances, altogether making a fine introduction to this natural citadel.

After Kota Tongkat, the path continues for another half mile to Kota Burong, where it passes over a stream and under a ceiling of rock to the mouth of the cave proper. It has a high pitched entrance but inside it develops into a tunnel with surprisingly few irregularities, somewhat reminiscent of the Underground at home. It indulges in some sharp turns and is very dark, the sort which is intense enough to be felt, and bats, with their buzzzing and wild flying, don't make the intruder feel the least bit at home.

In between Kota Tongkat and Burong, and to the left of the path, is Kota Glanggi. The entrance is in the hillside, about 100 feet up; it is small and the passage leading from it is narrow, but suddenly there looms up a tremendous cave, large enough to contain several cathedrals. Once one has got in, the entrance is difficult to find, for it is hidden by big boulders. At the opposite end, the cave is open to the fresh air, and to the left and right of this opening are supplementary caves which offer the best fun.

One of them leads to a long series of rooms, of queer shapes and sizes. The way into some is by a small hole down on the floor, and into others via a hole in

the ceiling. One of them develops into a chimney, with an outlet at the top for a breather. Thanks to the recent visit of the Sultan, the climb up the chimney has been facilitated by a ladder or two, and from the top, a path has been made to the summit of the cliff, which consists of bridges and ladders perched at queer angles over deep crevices. The view from the top is extensive, across the valley of the Pahang River, which is fringed by Malay cultivation, while all the remainder of the countryside is jungle—a typical instance of Malay occupation.

Returning to the main cave, down the chimney and to the big opening, there is a climb up to the right, up a deeply sloping rock, to a beautiful chapel-like cave. Its walls stretch up to a natural dome at least one hundred feet above, which is pierced by three or four ventilating holes almost symetrically arranged as if designed by human hand. The now familiar dim lighting is just strong enough to distinguish the design of the architecture but leaving a mysterious dimness to impress the intruder with the majesty of the setting. It is a truly arresting environment.

There is another cave near the entrance of Kota Glanggi, with the way in on the hillside in the same way. It appears to be a very small hole in the cliff, but a passage starting behind a boulder leads to a large cavern within. The passage only averages 3 feet in height and is about 100 feet long, so is so is uncomfortable travelling. The inner cave has some nasty holes in its floor and needs wary use of the torch, but it has an opening on to a ledge which would be a strategic position in any war, which one can imagine going on in and around these natural forts.

This is a most interesting region to explore for those who like scrambling. Malaya has no spectacular scenery: it's charm lies rather in its complacency. There are better caves than Kota Glanggi in England and more dangerous rock climbing in Wales than is provided by any of Malaya's inland cliffs. The mountains present no problems to mountaineers but are mainly hard sweats, and the rivers do not run into 1,000 feet waterfalls at every bend. If Malaya were like this it wouldn't be half the fun for the amateur, for the man in an office all the week who wants a pleasant change at week-ends, away from the big towns. For such a person, in search of exercise and fun, Malaya's the place to go in search of caves.

The Malayan Agri-Horticultural Association.

Annual General Meeting.

The Annual General Meeting of the Association was held on the 31st May, 1939, at the Association's Office, 8, Barrack Road, Kuala Lumpur. Datoh F. W. Douglas, President, was in the Chair.

On the proposal of Mr. A. T. Newboult, seconded by the Hon'ble Mr. W. N. C. Belgrave, the Annual Accounts and Report for 1938 were passed unanimously and adopted.

Datoh Douglas referring to the Report mentioned that although the depreciation for the year seemed on the high side, the Public Trustee had given his opinion that the values of the different buildings as now shown, were approximately correct.

A vote of thanks to the F.M.S. Government for their generous grant of $10,000 to the Association this year was carried unanimously.

Office Bearers.

The following were elected office bearers for the current year:—

President:—	Datoh F. W. Douglas,
Vice-Presidents:—	The Hon'ble the Adviser on Agriculture, M.S., (Mr. W. N. C. Belgrave), *ex-officio*, H.H. The Raja Muda of Perak, M.F.C., Datoh Klana, Sungei Ujong, The Hon'ble the Raja Uda, M.F.C., Tengku Yacob, Kedah, Tengku Ahmad, Johore, Tengku Biji Wangsa, Trengganu, Tengku Mohamed, Pahang, Dato Hussain, Bentong, Dato Perdana Mentri, Kelantan, 'Che Sheikh Ahmad bin Mohamed Hashim, Perlis, The Hon'ble Mr. W. G. C. Blunn, M.F.C., The Hon'ble Dr. K. T. Khong, M.F.C., Mr. L. Y. Swee.
General Committee:—	Messrs. H. L. Barnett, T. A. Buckley, V. L. Cachemaille, S. C. Colomb, Abdul Malik, Chew Sze Foong, Eu Kee Eng, Haji Mohamed Eusoff, A. F. Frisby, C. J. Gow, T. D. Marsh, A. T. Newboult, M. C. ff. Sheppard, W. R. Wallace and Pat Zilwa, M.C.H.
Stadium Sub-Committee:—	Datoh F. W. Douglas, Messrs. M. C. ff. Sheppard, Pat Zilwa, M.C.H., J. M. Laing.

Auditors.

Messrs. Walter Grenier & Co. were re-elected auditors for 1938.

REPORT FOR THE YEAR ENDED 31st DECEMBER, 1938.

The following gentlemen served on the General Committee of the Association during the year:—

President:— Datoh F. W. Douglas,

Vice-Presidents:— The Hon'ble The Adviser on Agriculture, M.S., (Mr. W. N. C. Belgrave), The Hon'ble The Raja Muda of Perak, M.F.C., The Hon'ble The Undang of Rembau, M.F.C., The Hon'ble Mr. Lai Tet Loke, M.F.C., The Hon'ble The Raja Uda, M.F.C., Tengku Yacob, Kedah, Tengku Ahmad, Muar, Tengku Stia, Trengganu, Dato Perdana Mentri, Kelantan, Mr. L. Y. Swee.

General Committee:— Messrs. A. T. Newboult, M. C. ff. Sheppard, H. L. Barnett, S. C. Colomb, W. R. Wallace, Eu Kee Eng, Chew Sze Foong, T. D. Marsh, E. W. Cooke (Deceased), V. L. Cachemaille, Pat Zilwa, M.C.H., R. G. H. Wilshaw, and Haji Mohamed Eusoff.

The Association suffered a great loss by the death of the late Mr. E. W Cooke who was on the General Committee for several years. He was also Section Secretary of the Poultry and Livestock Section on several occasions.

In October the Hon'ble Mr. O. T. Faulkner, C.M.G., left Malaya and he was succeeded by the Hon'ble Mr. W. N. C. Belgrave on the Committee.

Membership

Membership at close of 1938 was 399 (Life Members 107, Ordinary members 292). Affiliated Societies numbered 5. (Selangor Gardening Society, Singapore Gardening Society, Cameron Highlands Society, M.A.H.A. Tampin Branch, M.A.H.A. Rembau Branch).

Finance.

The Association suffered a loss of $466.90 in the Fifteenth Malayan Exhibition. Owing to lack of funds it was reluctantly decided to withhold the publication of the October issue of *The M.A.H.A. Magazine*, and, for the same reason, no debentures were drawn for redemption in 1938.

Fifteenth Malayan Exhibition.

The annual Malayan Exhibition was held as usual on the 30th, and 31st July and 1st August, 1938, and was opened by His Excellency The High Commissioner.

Attendance was 46,343 as compared with 35,378 in 1937, and the paying gate was $1,297.93 more than 1937.

Upkeep of Building.

The receipts just covered the expenditure. The Stadium was used for Malaya Cup matches (Selangor vs. Kedah and Selangor vs. Perak) and also for

the matches against the Islington Corinthians. The following Cup Tie matches were also played at the Stadium:—T.P.C.A. vs. Selangor Malays (2 matches) and Selangor Club vs. Police Depot.

The receipts from the Selangor Badminton Club were $776.24.

District Shows.

In addition to the award of bronze medals to the local Shows held in connection with the All-Malayan Padi Competition, silver and bronze medals were also awarded to District Shows.

Malayan Christmas Hampers.

This year the Association organised a scheme for the despatch of Kelantan silver instead of the usual hampers. It was not a success and only about 30 orders were received.

The M.A.H.A. Magazine.

Only three issues of *The M.A.H.A. Magazine* were published this year. As stated above, owing to lack of funds the October issue was not published.

Acknowledgment.

This opportunity is taken of expressing keen appreciation of the services rendered in connection with the Exhibition by the large number of voluntary workers, Section Secretaries, Stewards; by the Y.W.C.A.; the Girl Guides' Association; and the Boy Scouts' Association; by District Officers and the Agricultural and Co-operative Societies Departments; and the Rubber Research Institute of Malaya; by the F.M.S. Railways; the Electrical and Post & Telegraphs Departments.

Recognition is also made of the very great help given by the A.A.M. and the Police Department in connection with the Exhibition.

By Order of the Committee,

A. L. SHELTON PALMER,

Secretary.

KUALA LUMPUR,

22nd May, 1939.

MALAYAN AGRI-HORTICULTURAL ASSOCIATION

Balance Sheet as at 31st December, 1938.

(abridged)

LIABILITIES

DEBENTURES :—			
AUTHORISED.			
15,000 2½% Debentures of $10/- each ...		$150,000 00	
ISSUED.			
11,520, 2½% Debentures of $10 each fully paid ...		115,200 00	
Less 380 Debentures redeemed	3,800 00		
Less 300 Debentures cancelled ...	3,000 00	6,800 00	
		108,400 00	
Add 22 Debentures drawn for redemption and written back		220 00	$108,620 00
FORFEITURE OF DEBENTURE ACCOUNT ...			75 00
LIFE MEMBERSHIP SUBSCRIPTION ...			1,190 00
CREDITORS :—			
(i) Debenture Interest for the year ...		$ 2,715 50	
(ii) Unclaimed Debentures and Interest ..		523 54	
(iii) Miscellaneous, including uncashed cheques ...		933 58	4,172 62
			$114,047 62

ASSETS

CASH IN HAND, AT BANKERS (AS PER CERTIFICATES) ON DEBENTURE REDEMPTION ACCOUNT, INTEREST AND DEPOSITS			$ 2,651 29
SUNDRY DEBTORS			439 24
FURNITURE, FITTINGS, ETC.:—			
As per last Balance Sheet		$ 500 00	
Less Depreciation		100 00	400 00
EXHIBITION GROUNDS, BUILDINGS, ETC.			56,874 44
STADIUM			44,152 18
STOCK :—			
Medals in Hand			724 00
INCOME AND EXPENDITURE ACCOUNT :—			
Deficit per last Balance Sheet		2,843 16	
Add Adjustment of Debenture Interest written back in excess previously		21 75	
Deficit this year ...		5,941 56	8,806 47
			$114,047 62

We have examined the above Balance Sheet with the Books and Vouchers of the Malayan Agri-Horticultural Association, and have received all the information and explanations we have required.

We are of the opinion that the foregoing Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Association's affairs as at 31st December, 1938, according to the best of our information and the explanations given to us and as shown by the Books of the Association.

KUALA LUMPUR,

22nd May, 1939.

WALTER GRENIER & CO.,

Certified Accountants,

Auditors.

Income and Expenditure Acount, 1938 Exhibition.

1937	EXPENDITURE			
$ 1,992 11	To Trainfares and Freight ...			$ 2,337 64
2,820 00	„ Temporary Buildings ...			3,755 00
936 00	„ Salaries ...			844 35
80 70	„ Labour ...			224 40
150 00	„ Postages ...			100 00
287 45	„ Advertising—Press ...	$509 50		
	Posters ..	275 00		784 50
1,203 09	„ Medals ...			264 72
862 87	„ Prizes ...			1,310 30
356 28	„ Stationery ...			359 25
1,699 83	„ Lighting—Sanitary Board ...	802 42		
	Contractor ...	802 10		1,604 52
	Telephones ...			44 00
23 78	„ Fire Brigade ...			— —
247 75	„ Police ...			92 50
35 00	„ Amusements ...			592 74
212 59	„ Football ...			— —
552 43	„ Sundries ...			356 52
833 48	„ Section Expenses ...			977 59
276 75	„ Schedules ...			461 01
10 59	„ Padi Competition ...			13 89
24 91	„ Malayan Rubber Competition ...			3 06
	Insurance ...			96 50
	Radio ...			180 00
	Cafe and Bar ...			750 54
1,026 54	„ Balance ...			— —
$ 13,612 17				$ 15,153 03

1937	INCOME.	
$ 7,903 70	By Gate Money ...	$ 9,136 63
4,974 89	„ Stall Rents ...	4,245 50
380 00	„ Prize Fund ...	518 00
353 58	„ Commission ...	491 29
	Profit on Advertisements on Guides	229 72
	Balance being defeit	531 90
$ 13,612 17		$ 15,153 03

Working and Income and Expenditure Account for the year ended 31st December, 1938.

1937	EXPENDITURE.			1937	INCOME.		
$ 1,342. 90	To Stadium Expenses	...	$ 1.408 84	$ 1,026 54	By Net Income on Exhibition	...	$ — —
440 76	„ Assessment	...	440 76	5,900 00	„ Government Grants	...	6,050 00
1,783 66	„	...	$ 1.849 60	602 00	„ Subscriptions	...	584 00
	„ Deficit on Exhibition	...	531 90	45 00	„ Affiliation Fees	...	20 00
24 48	„ Bank Charges	...	26 21	1,623 38	„ Rentals, Stadium	...	1,841 48
144 07	„ Printing and Stationery	..	126 18	149 98	„ Malayan Hampers	...	— —
2,040 00	„ Salaries and Office Rent	...	2.040 00	91 66	„ Interest	...	83 66
250 00	„ Audit Fee	...	200 00				
236 17	„ Postages	...	107 54				
515 87	„ Magazines	...	358 74				
258 07	„ Miscellaneous	...	77 25				
	Malayan Hampers	...	276 46				
	Bad Debts	..	264 50				
4,186 24	„ Balance being surplus on Working Account carried down	...	2.720 76				
$ 9,438 56			$ 8,579 14	$ 9,438 56			$ 8,579 14
$ 2,715 50	To Debenture Interest	...	$ 2.715 50	$ 4,186 24	By Balance brought down	...	$ 2,720 76
7,389 30	„ Depreciation for the year	...	5,946 82	5,918 56	„ Balance being deficit	...	5,941 56
$ 10,104 80			$ 8,662 32	$ 10,104 80			$ 8,662 32

Selangor Gardening Society.

QUARTERLY NOTES

During May and June there have been four events of interest.

On May 24th Mr. A. Thompson of the Agricultural Department gave a lecture on plant diseases, in the new laboratories.

Mr. Thompson dealt mainly with the diseases which attack the roots of our plants in Malaya. He exhibited specimens of healthy and diseased roots, and explained causes and measures of prevention, emphasizing the necessity not only of discarding all soil and support sticks which had come into contact with diseased plants, but also of sterilizing the pots before putting them into use again. He also pointed out that kebuns who had touched diseased plants and their associated earth, should cleanse their hands with disinfecting soap before touching healthy plants.

Modern insecticide sprays were also discussed and demonstrated, and various insecticide solutions described.

Annual Flower Show.

On June 10th the Society held its annual Flower Show at the Race Course, Kuala Lumpur, the judges being Messrs. R. E. Holttum, T. D. Marsh, and Tong Takin.

From the point of view of number of entries, the Show was disappointing.

It is intended next year to hold the Show in March and to give at least three months' notice to the public through the Press.

The results were as follows:—

Specimen flowering plant in bloom: 1, Mrs. Tasker; 2, Mrs. Westrop.

Specimen flowering creeper in bloom: 1, Mrs. Wright; 2, Mr. Colomb.

Specimen Bougainvillea: 1, Mr. Waring; 2, Mr. Hampshire.

Collection of flowering plants of not less than three varieties and not more than 12 pots: 1, Mr. Hampshire; 2, Mrs. Montgomery; 3, Mrs. Blunn.

Terrestial Orchid in bloom: 1, Mr. Thurstan; 2, Mr. Thurstan.

Epiphytal Orchid: 1, Mr. Waring; 2, Mr. Waring.

Cattleya specimen plant in bloom: 1, Mr. Thurstan; 2, Mr. Thurstan.

Specimen fern of any variety: 1, Mrs. Westrop; 2, Mrs. Kerridge.

Three specimen ferns: each of different varieties: 1, Mrs. Loke Yew; 2, Mrs. Wright.

Specimen foliage plant: 1, Mrs. Loke Yew; 2, Mrs. Loke Yew.

Group of foliage plants: 1, Mrs. Loke Yew; 2, Mrs. Loke Yew.

Collection of cut flowers: (excluding cannas): 1, Mrs. Tasker: 2, Mrs. Arbuthnott.

Single vase or bowl of cut flowers (excluding cannas); 1, Mrs. Montgomery; 2, Mrs. Arbuthnott.

Collection of cut Cannas: 1, Mrs. Montgomery; 2, Mrs. Tasker.

Collection of cut Hibiscus: Mrs. Arbuthnott.

Specimen flowering plant: 1, Mrs. Arbuthnott; 2, Mrs. McDiarmid.

Flowers grown at hill stations. One bowl or vase of cut flowers grown above an elevation of 1,000 feet above sea level: Mrs. Loke Yew.

Special prize. Freak Croton, five varieties on one stem: Mr. Hampshire.

Tomato plants, two varieties: Special prizes, Mrs. Kerridge and Mrs. Tasker.

Lectures in Tamil and Malay for kebuns started on June 13th at the Plant House, Public Gardens, Kuala Lumpur, and are to continue for seven consecutive Tuesdays. These lectures are very popular and 26 kebuns are attending them.

On June 17th, Mr. T. D. Marsh and Dr. Brown kindly took members over the Central Experimental Station, Serdang, explaining the making of compost, and the processes of budgrafting and marcotting. A visit was also paid to the tea factory.

On July 5th Mr. N. C. E. Miller is to give a lecture on insect pests and Mr. Eu Kee Eng has kindly offered his garden for this purpose.

Future programmes will be posted to members in the course of the next few weeks.

L. R. K.

Singapore Gardening Society.

QUARTERLY NOTES

The meetings of the Society held in the second quarter of 1939 were as follows:—

April. Discussion on Flower Show at 5, Anderson Road by invitation of Mrs. C. Jackson.

May. Visit to Gardens at Government House by invitation of Lady Shenton Thomas.

June. Visit to "Buitenzorg," Paterson Road, by invitation of Dr. Hu Tsai Kuen. Talk by Dr. Hu Tsai Kuen on the construction of a rock garden and by Mr. Holttum on hybridization of Hibiscus.

The Society is greatly indebted to Mrs. C. Jackson, Lady Shenton Thomas and Dr. Hu Tsai Kuen for their hospitality.

Future Programme.

The programme suggested by the Committee for the second half of 1939 is as follows:—

July 24th. General Meeting. Competition of cut flowers by kind invitation of Mrs. C. R. Cherry, "Abbotsford," Cuscaden Road.

August 28th. Visit to Agricultural Station, Lim Chu Kang; talk on fruit trees, demonstration of propagation.

September 25th. Talk about flowering trees and hedges by Mr. Ewart.

October 30th. Preparation for Flower Show. Seed sowing and seedling planting demonstrated by Mr. Addison at the Potting Yard at the Botanic Gardens.

November 27th. Demonstration of tree pruning, by kind invitation of Mrs. Cherry, "Abbotsford," Cuscaden Road.

December 18th. Visit to flower gardens in Orchard Road.

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EDITORIAL

In the light of recent happenings the Sixteenth Malayan Exhibition already appears to have been held in another age, but nevertheless we follow our usual custom and present in this issue a full report of what proved to be one of the most successful Shows the Association has organized.

The Association owes much to the F.M.S. Government, which, by its generous special grant of $10,000, made possible the erection of further extensive permanent buildings, which, in turn, contributed greatly to the success of the Exhibition.

The success of the State stalls for arts and crafts was extremely gratifying, and demonstrates both the value of these local industries to Malaya and the part the Exhibition has played in assisting their development. Within recent years the increase in the total value of sales in this Section is in the neighbourhood of $5,000 which, in addition to shewing clearly the very substantial growth of village industries as a factor of economic importance, is a tribute to the voluntary work done by the organizers in the various States, and must be a source of considerable satisfaction to them.

Emergency Food Crops.

We reprint in this issue an article entitled "The Cultivation of Food Crops on Estates" by Mr. W. N. C. Belgrave, the Adviser on Agriculture, which appeared recently in the *Malayan Agricultural Journal*. The article has already received wide publicity, but may be of interest to readers who have not already had an opportunity of reading it.

In our next issue we hope to include notes on vegetables suitable for planting in home gardens, as there are doubtless many readers who have spare portions of their gardens which they would be glad to devote to the raising of foodstuffs.

Malayan Agri-Horticultural Association.

THE SIXTEENTH MALAYAN EXHIBITION

BY

H. L. BARNETT.

The Malayan Agri-Horticultural Association is to be congratulated on the success of this year's Malayan Exhibition, which was held as usual in Kuala Lumpur during the August Bank Holidays, the 5th, 6th and 7th August, 1939.

Largely owing to the provision of additional permanent buildings, made possible by a special grant of $10,000 by the Federated Malay States Government, the general lay-out of the Exhibition was considerably improved and the increased crowds of visitors more satisfactorily accommodated. In particular, State village industry stalls benefited by being allocated the largest of the new buildings, and they constituted the principal attraction of the Exhibition.

The Association is fortunate in having this year as their Secretary, Mr. G. Shelton-Palmer, to whom much of the credit for the success of the Exhibition should go.

The long period of drought commenced to break during the Exhibition, but fortunately rains were not severe and did not affect attendances, which were the highest recorded for several years. The official figures show a total attendance of 48,542. of which 36,325 paid for admission and 12,217 were admitted on members' and free passes. In 1938 the total attendance was 46,679, and 35,378 in 1937.

Opening Ceremony

The Exhibition was opened by His Excellency the Governor and High Commissioner, Sir Shenton Thomas, G.C.M.G., O.B.E., in the presence of a distinguished gathering which included Lady Thomas, His Highness the Sultan of Selangor, His Highness the Sultan of Pahang, His Highness the Raja Muda of Perak, the British Resident, Selangor, the British Resident, Pahang, and the Federal Secretary.

In asking His Excellency to open the Exhibition Dato F. W. Douglas, President of the Association, claimed that the Exhibition provided the only opportunity for a view to be obtained of life in Malaya from the many angles normally not available in everyday life. Discussing the rice crop of Malaya and making a comparison with Java, he pointed out that production of rice had increased by 27 per cent. and the area planted by 12 per cent., but that it could not be considered a money-yielding crop. He suggested that the problem is to ensure that the producer obtains such a price for his padi that he will prefer growing it to other forms of cultivation or employment, and urged the provision of water supply to padi areas at present dependent on the vagaries of the weather.

His Excellency's speech was as follows:—

> **"Once again it is my pleasant duty to open the Annual Exhibition of the Malayan Agri-Horticultural Association; once again I have to record that the Exhibition of this year—the sixteenth of its kind—is larger and**

better in the number and variety of exhibits than it has ever been before. For this encouragement our thanks are due, first, to the organizers who by their enthusiasm and ability have proved that an exhibition of this sort is well worth while; secondly to the exhibitors who have so readily accepted the opportunity to display what they make and what they sell; and thirdly, to the F.M.S. Government which, like a fairy god-mother, has once more yielded to the importunity of your President and has provided funds which have been used to erect a permanent building for the exhibits of arts and crafts from the various States. And, now that I have mentioned your President, I think that a very special word of thanks is due to Mr. F. W. Douglas, who has been President of the Association since it was started in 1923 and to whose never failing interest and help all of us who are here to-day and will be here during the next few days owe so much. He may well be pleased with the fruit of his labours.

One of the most satisfactory features of this Exhibition is the Trade Section, where every inch of space has been taken up. This, to my mind, is practical proof of the value of this Exhibition to the trade and commerce of Malaya. It speaks well, also, for the enterprise of commercial firms, who realize that to sell goods they must advertise them and that it is a wise policy to maintain their activities in lean years so that they may be able to reap the best advantage of the fat years which will surely come.

Once again the Sultan of Selangor has taken up space at his own expense, but this year instead of one stall only, His Highness is represented by two. There you will be able to see, and to buy, products of the villages of the State of Selangor, and in offering to the Sultan my hearty congratulations on the success of last year's venture I add the hope that this year it may be even greater.

Whereas last year five States were represented in the Arts and Crafts Section, this year there are nine, and there is the usual attractive exhibit from the Sultan Idris Training College at Tanjong Malim where we can buy, among other things, our yearly supply of baskets. Added interest is given to the Arts and Crafts Section by the presence of a number of craftsmen. There are weavers in silk from Pekan, Kota Bharu, Klang, and Tanjong Malim; there are weavers in fibre from Negri Sembilan, Malacca, and Perak. There are potters from Kedah, silversmiths from Kedah, Kelantan, and Brunei, ropemakers and top makers from Malacca. It is clear that this Exhibition has taken a strong hold on the imagination of the people.

I wish now to turn for a moment to the subject of food production about which your President has just spoken and which has been engaging the earnest attention of my advisers and myself for many months past. There is no need for me to stress the importance of this matter. The chief article of diet for the mass of the population of Malaya is rice, and the cold fact is that for every ton of rice produced in this country two tons have got to be imported. Much has been done since my predecessor started his campaign for local rice production, and since the formation of the Drainage and Irrigation Department in 1932, irrigation facilities have been improved on 123,000 acres of land, and irrigation has been provided on a further 42,500 acres. This good work continues.

Mr. Douglas has compared us with Java, but there are two good reasons why this comparison should not be pushed to extremes. First, the pressure of population in Java is such that the Javanese must work far harder to secure a living than is necessary for the people of Malaya; and secondly, the Javanese who can derive an income from rubber cultivation are very

few. In Malaya, more than 1¼ million acres of rubber are in the hands of small-holders, and our total population is less than 5,000,000 people. In Java the population exceeds 40 million and the small holdings of rubber are only 37,000 acres.

Nevertheless, we are faced with the unpleasant fact that we are dependent on outside sources for two-thirds of an essential article of food, and that in time of emergency these supplies may be wholly or partially cut off or may be procurable only at enormous cost which would inevitably involve increases in taxation. I am told that during or shortly after the Great War rice was $1 a gantang which is equivalent to $15.16 a picul.

A new feature of this Exhibition is a map of Malaya at the far end of the main building. On it you will see the areas now under padi cultivation and the areas that are still available, and suitable, for padi cultivation. There is no doubt at all that the production of padi in Malaya could be vastly increased if only we had the farmers; and the question which we have to face to-day is: "Are we going all out for that increase; or are we going to continue to accept the very real risk of short commons if not actual starvation in time of emergency?"

In times like this, when it is the bounden duty of every country within the Empire to defend itself against whatever may befall, there can be only one answer: The land is here, and the population is here; it remains for proper opportunities to be given to Asiatics other than Malays to take up the cultivation of padi. I am glad to say that the State of Johore has already adopted this policy and I trust that the other States will follow this lead without delay. There is no question of depriving the Malays of the use of any land which they can cultivate: the map will show you that there is ample for them and for others as well. Of the 1¼ million acres of small holdings under rubber, by far the largest proportion is in the hands of Malays; and there is no reason why Malays and other races of Asiatics should not grow padi side by side just as they cultivate rubber. All that I ask, therefore, is that suitable land which is not and cannot be put under cultivation by Malays shall be made available to others. And I say that by accepting this policy the State Governments will make a real and practical contribution to the defence of the Empire.

I know that what I have said will not be popular in some quarters and I realize that it will be criticised. But I say again that we are living in critical times, and it would be wrong of me to gloss over with smooth words the serious nature of the position here in regard to food supplies I believe that as a general rule people prefer to know exactly how they stand even though they may not like it, and I ask my critics to ponder before they speak or rush into print, and to ask themselves what other course is open. If they can think of a better course, I shall be very ready to consider it; but if they cannot, then I hope that they will be honest with themselves and me, and say so.

Your Highnesses, ladies and gentlemen, I declare this Exhibition to be open, and I offer on your behalf my cordial thanks to all those who have worked so hard to ensure its success."

Competitive Sections

All-Malayan Padi Competition.

This competition was organized for the sixth consecutive year on a Malayan basis. The final stage—or Central Competition—is held in conjunction with the Malayan Exhibition, and is the culmination of numerous small local Padi Com-

petitions, larger District Agricultural Shows and State Shows. Prize-winning exhibits thus may have competed in three competitions before appearing at Kuala Lumpur.

The following table summarizes the intermediate Shows which have been held.

Territory	Local Padi Competitions.	District Shows	State Shows
Kedah (northern area) ...	—	1	—
Kelantan ...	—	5	1
Penang ...	—	1	—
Province Wellesley ...	9	3	—
Perak ...	36	9	1
Selangor ...	10	6	—
Pahang ...	57	6	1
Negri Sembilan ..	23	2	—
Malacca ...	15	3	—
Johore ...	—	1	—

The number of exhibits received for the Central Competition from each of these States and Settlements was as follows:—Penang and Province Wellesley 12 (15), Kedah 3 (0), Kelantan 2 (3), Perak 54 (33), Selangor 17 (18), Pahang 12 (13), Negri Sembilan 10 (15), Johore 6 (0), Malacca 14 (12), total 130 (109). The figures in brackets are for 1938.

The general standard of padi was surprisingly low, except for a number of good exhibits of long-grained Siam type chiefly from Malacca and Kuala Selangor. The three exhibits from North Kedah were also of this type, of which two were fairly good but not well enough ripened.

Penang and Province Wellesley sent a miscellaneous collection of medium-grained varieties, all below prize-winning quality, which is unusual.

Perak sent in 54 exhibits, all but two of which were unexpectedly poor in quality, particularly 24 Radin Merah exhibits and 14 Seraup type exhibits.

Selangor had a difficult padi season, with dry weather, in scattered or young padi areas, but the standard of exhibits made a distinct advance on that of other years. It was particularly interesting to see several good long-grained Siam or Mayang Rotan exhibits from the important young Panchang Bedena and Tanjong Karang areas of Kuala Selangor.

Pahang also had a difficult season with drought in October last, and then floods. Of the 12 exhibits sent in, four were short-grained Milek varieties, five were medium-grained Radin Kuning, and three were bold-grained Padi Kampar.

Exhibits from Negri Sembilan were below average quality, and the State Agricultural Officer sent fewer than the maximum on this account. These included fair samples of Serendah Kuning, a popular medium bold-grained variety of padi, and three samples of Seraup, one of which was good. The grains of this exhibit, however, were not too well filled and it was awarded only a second prize, being the only prize given in the Seraup class.

Johore sent two exhibits of Nachin Puteh and one very good one of Serendah Kuning which won a first prize. Johore had a good season for padi cultivation.

Kelantan sent in only two exhibits, one of which, a long-grained Anak Naga, gained a third prize.

Malacca's exhibits included ten of Siam type, two of Nachin type and one of Serendah Kuning. Of these the Siams were much the best, gaining first, second, and a third prize in this class. The first prize also gained the special gold medal for the best exhibit of the competition. This exhibit was an excellent sample of Siam, very well ripened and with well filled grains. It did not appear to be the Department's selection, Siam 29, as were most of the other Siams. Malacca was also awarded the shield for the superior quality of its exhibits.

A feature of the competition was the general poor quality of exhibits from the north of the country—Kedah, Province Wellesley and Perak—the fault being uneven ripeness, under-ripeness and poorly filled grain.

The season in Kedah has been good with a record harvest of grain; crops in Province Wellesley have been very good, and those in Perak have also been better than last year, yet there is this unexpected default in quality, due presumably to various difficulties of water control at harvest time.

Prize winners are as follows:—

Long Grains—1st prize for Siam from Alor Gajah, Malacca.
—2nd prize for Siam 29 from Paya Rumpat, Malacca.
—3rd prize, three awards for Siam 29 from Alor Gajah, Malacca, Anak Naga from Kota Bahru, Kelantan, and Siam 29 from Tanjong Karang, Kuala Selangor, Selangor.

Seraup type—2nd prize for Seraup from Labu, Negri Sembilan.

Radin types—1st prize for Serendah Kuning from Labis, Segamat, Johore.
—2nd prize for Radin Kuning from Kuala Kangsar, Perak.

Judging this year was comparatively easy on account of the large number of exhibits which were quickly discarded on account of the faults already mentioned, uneven ripeness being the most common.

It is of interest to note the trend of types of padi:—Penang—Mayang Sa-Batil; Province Wellesley—various medium grain types; Perak—Seraups and Radins; Pahang—short and medium grain varieties; Negri Sembilan and Johore—no selected strains, Serendah Kuning notable; Selangor—long grain Siam and large grained Kelantan types; Malacca—Siam.

In spite of the generally poor standard of padi samples exhibited this year, there is no doubt that the percentage of samples containing pure or unmixed grain has greatly increased during the six years. This is the point that has been most emphasized in competitions so far, and it appears to have had some effect.

All-Malayan Small-Holders' Rubber Competition.

This competition is organized on the lines of the padi competition, and entries are confined to sheet rubber produced and smoked on holdings of less than 25 acres. This year a total of 130 entries was received.

The average quality of the rubber was lower than in the past two or three years, but the prize-winning exhibits were of the usual high standard. The chief defect of the poorer entries was dirt. Another serious fault was stickiness, mostly caused by insufficient washing but in a few cases due apparently to the use of sulphuric acid as a coagulant. The need for unremitting care and cleanliness is still evident.

Eight equal prizes were awarded, five going to small-holders in Pahang, one to Brunei, one to Selangor, and one to Negri Sembilan. The prize winners comprised five Malays and three Chinese.

Agricultural Section.

In recent years the policy of the organizers of this Section has been altered; late entries are not accepted and exhibits not considered up to the standard of an exhibition organized on a Malayan basis are rejected. The result has been a diminution in the total number of exhibits displayed, which has permitted more satisfactory display of selected exhibits and increased the importance and value of the Section.

This year the exhibits were generally of a high standard, and few submitted were unsuitable for display. The total number received was 3,371 of which nearly 1,600 were fruits and vegetables. The complete absence of hill vegetables was noticeable.

The quality of the vegetables was remarkable in view of the long preceding period of drought. A record number of exhibits of Chinese green tea was shown, but the classes for black tea were not so well supported as those for green tea. The exhibits of prepared coffee were poor in quantity and quality. Soap made by small producers showed marked advance on previous years. The exhibits of small-holders' copra were remarkably good, showing a great advance on previous years, and were representative of the whole of Malaya with the exception of Johore.

The Section was constantly crowded with visitors who took a keen interest in exhibits, and it would sustain such interest if all classes were clearly labelled with the name of the product.

Horticulture

This Section benefited from being housed in one of the new permanent buildings, which had been specially designed to accommodate horticultural exhibits. The result was extremely successful and marked a further step in the general development of the Exhibition.

There was a very fine commercial display of flowers from Fraser's Hill, recalling the fact that Malaya imported in 1938 fresh flowers to the value of over $24,000.

Poultry

This Section gained from being housed in part of one of the new buildings, and a large number of entries was received. Small-holders' exhibits of pure-bred

birds were again noteworthy, and, for the first time the special awards, with one exception, were awarded to Malay exhibitors. The gold medal awarded for the best bird in the Show was won by a Malay small-holder.

Quite a brisk business was done in sales of exhibits in spite of the high prices demanded by owners.

Cats and Aquatic Section.

A portion of one of the new buildings was allotted to the Cats Section which this year was held on the first two days instead of on the third day as in previous years. There was a satisfactory number of entries and some very fine cats were displayed. The new penning arrangements were a considerable improvement.

An innovation was the aquatic group for exhibits of miniature aquariums which produced a good response and was of considerable interest to sightseers. There was also a miscellaneous group for rabbits, guinea pigs and squirrels which was well supported by exhibitors.

Arts and Crafts.

Village Industries.

There are two distinct groups in the Village Industries Section, the competitive classes and the State stalls. The latter group this year was housed in the largest of the new buildings, which will be its permanent home. The new buildings permitted a much improved lay-out while also allowing much more space for visitors, and this Section was probably the most popular of the Exhibition.

Nearly the whole of Malaya was represented by State stalls this year: Perak, Selangor, Negri Sembilan and Pahang; Kedah, Kelantan, Trengganu and Brunei. Malacca was the only Settlement to exhibit and there was also the stall of the Sultan Idris Training College, Tanjong Malim, Perak. Selangor was represented by two stalls but these were in the main building at the special request of His Highness the Sultan, and rent was paid for them as in the case of trade stalls.

The Kelantan stall won the Governor's Cup for the third year in succession for the best stall in the Section, and had a particularly wide range of silverware and locally-woven materials on sale and display.

The noticeable feature of this group was the large number of craftsmen actually at work, who were a constant source of interest to sightseers. There were workers from Selangor, Pahang, Kelantan and Trengganu weaving on cottage looms, potters from Perak and Kedah, a silversmith from Kedah, Malay girls from Malacca making mats and bags, and men from Negri Sembilan and Pahang turning wooden tops on primitive, but very efficient, lathes. The Brunei stall, in addition to a display of silver work, had a very fine collection of Brunei gongs for sale which occasioned much interest.

The value of this group can be gauged from the fact that total sales were in the neighbourhood of $7,000 irrespective of orders of which Kelantan's share will keep their workers occupied for three months.

The competitive group of this Section was housed in the main building, but it suffered from the development of the State stall group, and entries received were disappointing both in numbers and quality when compared with previous years. Sales of exhibits, which in 1938 were over $400, totalled only $221.

School Industries.

The competitive Schools Section is divided into four main groups; i. English Schools—Boys; ii. English Schools—Girls; iii. Malay Schools—Boys; iv. Malay Schools—Girls. The standard of exhibits was very high, and only the best exhibits were displayed.

Several schools had their own stalls, and a notable stall was that of the Pensionnat Notre Dame, Cameron Highlands, which displayed work of a very high standard.

This year a separate building was allocated to the Trade Schools, of which there are five: Kuala Lumpur, Singapore, Penang, Johore and Malacca. Exhibits ranged from machinery to furniture and tailoring and were a valuable indication of the work carried out in these schools.

Needlework and Handwork: Preserves and Confectionery.

Both these Sections were well supported and exhibits reached a high standard. The Needlework and Handwork Section is confined to handmade articles. The Preserves and Confectionery Section, which last year was not included in the Exhibition, made a welcome re-appearance. Unfortunately it had to be accommodated in the main building and thus suffered to a certain extent from dust.

Art and Photography.

The total number of exhibits received was 468, thus again creating a record. In 1938 exhibits numbered 439, and in previous years did not reach 300. Owing to this large entry the space allotted to the Section was completely inadequate, but the organizers are to be congratulated on the results achieved with the limited space available.

The outstanding feature of the Section was the surprisingly high standard reached by so many of the exhibitors and this was particularly noticeable in the group for water-colours. Several oils were of outstanding merit, and consideration will have to be given to the provision of classes for amateurs and professionals as is already done in the photography group.

The photography classes did not show the same marked improvement over former years, the professional exhibits, with certain marked exceptions, failing to reach previous standards.

Trade Section.

The Trade Section has not yet regained the size and importance which it reached a few years ago, but this year there was a very satisfactory display, staged as usual in the main building of the Exhibition. It included two Selangor State stalls organized by the Raja Bendahara of Selangor, and displays by the F.M.S. Railways, and Electrical, and Posts and Telegraphs Departments. The Malay Regiment again had a stand in this Section on which were displayed the new Bren guns and an anti-tank gun.

Departmental Exhibitors.

The Department of Agriculture was responsible for the staging of the All-Malayan Padi Competition, and certain of its officers were the organizers of the Agricultural and Oils and Fats Section. In addition there were on display examples of the food crops recently recommended for cultivation on estates.

The Rubber Research Institute of Malaya again organized the All-Malayan Small-Holders' Rubber Competition, and in addition kept open its laboratories during the period of the Exhibition for inspection by interested visitors. Members of the staff were in attendance for consultation, and demonstrations of budgrafting were given at the Institute for the benefit of small-holders. In addition to the demonstrations, exhibits were displayed showing the complete operation of budgrafting as detailed in a recent publication of the Institute. The demonstration were well attended and a total of over 400 persons visited the Institute.

The Electrical Department had an attractive stall demonstrating a vertical gravel pump for use in open-cast tin mines.

The F.M.S. Railways displayed machine-shop equipment used at their workshops in addition to providing facilities for dealing with enquiries and the sale of tickets.

The Posts and Telegraphs Department provided a Post Office for the convenience of visitors to the Exhibition, and also staged an extremely interesting display of technical equipment used in connexion with the Department's various services.

The Medical Department has its own permanent building and staged comprehensive instructional exhibits dealing with infant welfare work, anti-mosquito measures and general sanitation.

The Exhibition authorities had prepared, with the co-operation of the Surveys Department, a very large map of Malaya which was displayed in the main building showing padi areas and other areas under agricultural development together with comparative figures of rice production in Malaya and the Netherlands Indies.

Entertainments.

A large and varied programme of entertainments was provided throughout the three days of the Exhibition. Of particular interest was the film " The Five Faces of Malaya " which was shown for the first time in Malaya at the Exhibition. The Wuhan Songsters gave special programmes each night in the Stadium. A top-spinning competition in which 23 teams took part created considerable interest and attracted large crowds daily.

Football matches and the Malayan Cycling Championship were held in the Stadium. Beating of " Retreat " took place each evening, being played in turn by the band and drums of the 2nd (Sel.) Battalion of the F.M.S.V.F., Malay Regiment and F.M.S. Police. The F.M.S. Police Depot staged their popular *Bangsawan*, and a Penang " Boria " was given on two evenings.

A cine-film competition was organized for the second year in succession, and films were displayed for judging in the cinema hall.

Acknowledgments.

Acknowledgment is made to Mr. R. B. Jagoe, Botanist, for the report on the All-Malayan Padi Competition, to the Rubber Research Institute of Malaya for the report of the judges of the All-Malayan Small-Holders' Rubber Competition, and to various Section Secretaries for material incorporated in this report.

Agriculture.

THE CULTIVATION OF FOOD CROPS ON ESTATES *

In the course of a speech on Defence made in the Federal Council on the 18th May His Excellency the High Commissioner said:

> " The Government of the Federation is prepared to extend further the system of rebate of rent on any estate land suitable for the purpose which estate owners may wish to set aside as allotments for the cultivation of foodstuffs by their labourers. Enquiries should be addressed to the British Residents. Suitable foodstuffs would be groundnuts, cassava, sweet potatoes, maize, bananas and vegetables of all sorts, especially onions, but the selection would be left to the individual. I have also asked estate owners to consider whether they can plant foodstuffs as a cover crop on the areas now being opened up for new planting or for the replanting of rubber. If they cannot do it themselves, they might be able to let out the work to a contractor. I have also asked the Malayan Governments to make as easy as possible the alienation of land for the growing of vegetables."

An article describing certain successful allotment gardens was published in the *Malayan Agricultural Journal* for November, 1938. This publication may be obtained on application to the Department of Agriculture, price 50 cents post free. A leaflet in English and Tamil describing suitable crops for allotments may also be obtained from the same source, free of charge.

It is hoped that the following notes may be of service to those in charge of rubber estates who contemplate planting of foodstuffs on new or replanted areas.

The dominant factor in relation to the growth of dry land food crops in Malaya is the comparative poverty of our soils. On virgin soil one good crop should be obtained and a second medium crop is often possible, but thereafter yields decline rapidly unless heavy manuring with animal manure or compost be undertaken. Large quantities of animal manure are unobtainable on all but a few estates; compost can be made from slashings of natural growth or cover but transport is likely to be expensive. The aim of estates should be to plant relatively small areas sufficient for their own population, so that fresh land may be available in a second or subsequent season.

Steep slopes are unsuited to food cultivation. Undulating land can be used when terraced; even then great care must be taken to avoid soil erosion. Cover crop, if already established, should be left at the edge of the terrace in order to prevent loss of surface soil; if not established, cover should be planted in this position.

On flat land drainage is essential. On peaty areas care must be taken to adjust the height of the water table to prevent the crop suffering from lack of moisture during the dry season.

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* By W. N. C. Belgrave, Director of Agriculture, S.S. and Adviser on Agriculture, M.S., *Malayan Agricultural Journal*, June, 1939.

Effect of Food Crops on Rubber.

Authorities of the Rubber Research Institute of Malaya are of opinion that so far as the trees are concerned " Food crops could probably be cultivated for the first two years after planting without affecting the trees directly. It is suggested that after two years, cultivation of food crops, particularly root crops would be harmful, the longer the period after planting the greater the ill effects." On theoretical grounds, however, the same authorities fear that cultivation (necessarily deep for root crops) may destroy the natural structure of the soil thus ultimately reducing its capacity to absorb water. The obvious danger from erosion is also stressed. Those responsible for rubber estates must of course exercise their own judgment but the writer of these notes is definitely of the opinion that the cultivation necessary to grow one crop, even if a root crop, will not seriously, if at all, impair soil structure. The importance to Malaya of food production will doubtless be given due consideration.

New Plantings.

Possible crops for virgin soil, in order of duration, are ragi, groundnuts and maize, sweet potatoes, yams, bananas and tapioca. Short notes on these follow and further information may be obtained from State Agricultural Officers. Combining the figures for yields given in the notes with the known energy producing value of the various foods, it appears that to replace the normal rice ration of one person for one year would require the produce from 1/10th to 1/7th of an acre of root crops; thus an area of 20 to 30 acres of such crops should produce enough food for a population of 200 for one year.* In point of fact it is unlikely that these foodstuffs would be required completely to replace rice, their use would be rather to supplement a reduced rice ration. Such small areas should be within the means of nearly all estates undertaking new planting. Groundnuts have a higher food value but a lower yield than root crops and the equivalent of a year's ration of rice should be secured from one-quarter of an acre.

Estates would be well advised to plant a mixture of crops in order to take advantage of their differing maturation periods and also to guard against the failure of one or more of them from unsuitable soil conditions or pest attack.

Replanting.

Cropping on replanted areas is a more difficult matter. Practically all such areas suffered severely from exposure in early years and on them tapioca alone may be expected to give even moderate yields. Where compost can conveniently be applied, a dressing of 10 tons to the acre is recommended, or failing this, the turning in of a cover crop. It is of little use to plant even tapioca on poor, washed, baked soil without preliminary treatment.

Planting Material.

A certain amount of fresh ragi seed is obtainable from the Central Experiment Station, Serdang. Local supplies of planting material of the other crops should

* These figures are based on the assumption that quantities of foodstuffs supplying similar amounts of energy (expressed in calories) are of equal food value. This is believed to be reasonably correct over a relatively short emergency period but it should be realized that no claim is made that this basis of calculation is valid from the point of view of maintenance of optimum health over lengthy periods.

suffice for a moderate amount of planting, but any sudden increase of demand which would arise in the event of an emergency might exhaust local supplies. Estate managers who do not see their way immediately to respond to His Excellency's appeal would, therefore, be well advised to lay down areas of 1 or 2 acres of nursery to provide their own planting material should this be required later.

Root crops, if near the jungle, may suffer from the depredations of wild pig and it may be necessary to guard such areas or to set poison baits.

Crops.

The food crops which are recommended for planting are detailed below. Brief cultural notes are offered on each crop.

(a) RAGI.

This crop provides one of the most important foods of the Telegu community. Tamils also grow it in their own gardens to a limited extent but showed themselves reluctant to eat it in quantity during the last rice shortage. It is, however, a valuable crop for estates employing Telegu labour, more especially as it will thrive on land of only moderate fertility. The seed rate is 5 lbs. per acre. Yields varying from 500 to 1,000 lbs. per acre may be expected. Owing to the depredations by birds at the time of harvest children should be employed to scare birds.

(b) GROUNDNUTS.

Groundnuts require a light, friable, well-drained soil; heavy compost soils are unsuited to them. A dressing of lime at the rate of 1 ton per acre is recommended. The soil is worked to a depth of about 5 ins. and seed is planted on ridges of 18 ins. apart; seed should be dibbled in on the ridges at 12 ins. intervals, using two or three seeds at each point. Planting towards the end of the wet season is recommended. The nuts are ready to harvest about 100 days after sowing. Yields of about 1,000 lbs. of clean nuts per acre should be secured under favourable conditions. The pods are particularly liable to depredation of rats while the plant is still growing and poison baits would doubtless be advantageous.

(c) MAIZE.

The best soils for maize are rich, light sandy loams along the banks of rivers or streams, more especially where intermittent flooding occurs. Peaty soils are to be avoided and heavy clays are unsuitable; poor soils are useless. The land should be dug over and seed dibbled into holes 2 to 3 ins. deep, spaced 9 to 12 ins. apart in rows 3 ft. apart. Generally three seeds are placed in each hole and lightly covered with soil which is compressed by the foot of the sower. Planting is best done in March, April or November. Surface weeding is undertaken; later the weaker plants are removed to leave one at each point and as the crop increases in height the soil is mounded around the base of the plants. The crop matures in 3 to 6 months according to variety. Yields of grain of 1,800 to 2,000 lbs. per acre may be expected under favourable conditions.

(d) SWEET POTATOES.

This crop thrives best in a light sandy loam which has been deeply cultivated. Propagation is by cuttings of semi-matured portion of the stem, about 9 ins. long;

two nodes are placed underground and one is uncovered, the cuttings are planted about 30 degrees from the horizontal and the soil is compacted around the cuttings. They are planted about 18 ins. apart on ridges which are spaced from 2 to 3 ft. from centre to centre. The trailing stems are periodically turned back on the ridges to prevent them rooting in the soil and causing consequent decrease in the size of the main root tubers. The crop may be harvested from 3 to 6 months after planting depending on variety, and the yield of tubers varies from 3 to 6 tons per acre depending on the level of the fertility of the land and on the variety used. To ascertain whether the crop is ready for lifting a few tubers may be examined. If they be cut through and the sap dries rapidly forming a white crust they are matured. Another indication of maturity is when the leaves begin to turn yellow.

(e) YAMS.

Yams are propagated from tubers, which are usually permitted to sprout and afterwards cut into "sets," each of which should include two young shoots. Deep cultivation and thorough drainage is required. A loose type of soil is the most suitable. Sets are planted at 2 ft. intervals in ridges 4 ft. apart. The crop takes about 10 months to mature and maturity is indicated by cessation of growth and drying of the leaves. The tubers are lifted as required as they do not keep long after harvest. On the other hand if left too long in the ground they become woody and start to sprout. Yields of 7 to 10 tons per acre may be expected, and on soils of high fertility these yields may be doubled.

There are two types of yams, the greater yam which is a coarse tuber and the lesser yam which is of a finer type, and is in general preferred. Some of the lesser yams are thorny climbers; tubers are smaller than those of the greater yam, but are produced in greater quantity, but the yield per acre is not necessarily greater.

Both yams have been found to give higher yields if the plants are allowed to climb strong poles about 10 ft. high.

(f) BANANAS.

The banana flourishes best on heavy soils fairly rich in organic matter and also in moist situations provided the soil is well drained. Propagation is effected by small suckers which are planted at distances of 10 to 15 ft. apart. Large holes are opened and partly filled with good surface soil. The first bunch of fruits is usually produced at about 1 year from planting. Too many suckers should not be allowed to grow from one parent plant. The variety *Pisang Embun* is probably the heaviest yielder and, therefore, the most desirable for the purpose in view.

Bananas in Malaya are subject to attack of Panama disease, but provided that suckers are obtained from areas where the disease is non-existent there should be a good chance of obtaining at least one harvest.

(g) TAPIOCA.

Tapioca will grow on almost any well-drained soil. It has for long borne the reputation of being an extremely exhausting crop, but this bad reputation is not due to the crop itself but to the methods of cultivation formerly employed.

Many crops of tapioca were taken off the land without manuring or adequate measures for the prevention of soil erosion, and the land was then allowed to revert to natural conditions.

Tapioca is best planted on ridges at 3 ft. intervals and 3 ft. distance, but may also be planted on the flat. It is propagated by cuttings taken from mature part of the stem. Cuttings 5 to 6 ins. long are planted at an angle of about 30 degrees from the horizontal, with three-quarters of the cutting below the surface of the soil, which is consolidated by treading. The planting distance recommended is closer than that usually employed by Chinese but has the advantage that the necessity for weeding is greatly reduced.

The crop takes from 12 to 14 months fully to mature but current requirements may be lifted 7 or 8 months after planting. Yields of about 7 tons per acre should be obtained under favourable conditions.

Pigs.

The rearing of pigs, more especially where a nucleus already exists, is worthy of serious consideration. The number of pigs in Malaya has been rising steadily during the past few years and breeding animals should be easy to procure.

Sweet potato foliage provides an excellent basis for pig food. Cropping of the vines is done at intervals of 1 month to 6 weeks and liberal application of liquid (pig) manure is made after each cutting to induce fresh growth. Tuber production is not aimed at.

Another good food is colocasia (*ubi keladi*) which grows luxuriantly on the coastal flats. Both leaves and stem are employed, after cooking, for pigs, and the tubers are fit for human consumption.

Experiments conducted at Serdang have shown that pigs fed on a ration containing copra made normal live weight increases and suffered no ill effects from the excess of oil ingested.

[The following note to the foregoing article has been issued by the Department of Agriculture].

It is believed that some managers have hesitated to follow the advice given in the *Malayan Agricultural Journal* of June, 1939 to plant food crops among young rubber because of the fear that soil structure might be impaired.

The matter has been referred to the Director, Rubber Research Institute of Malaya, who considers that risk of damage is slight provided that proper precautions are taken against soil erosion and that the soil is not left bare longer than is absolutely necessary.

Horticulture.

SOME NOTES ON THE CULTIVATION OF SPATHOGLOTTIS

BY

A. G. SANDERS.

The common *Spathoglottis plicata*, together with its varieties, with which we are all so familiar, grows and flowers so well in Malaya under very widely varying conditions of cultivation that these notes may appear superfluous.

I have found, however, that generous treatment in the matter of cultivation produces results such as to justify us including this common orchid among the most spectacular of our local garden plants.

To begin with I think that to be seen at their best Spathoglottis should be grown massed in beds, preferably raised, or in really large pots or tubs; a raised border too provides an ideal situation for shewing the plant to advantage.

When selecting a position for growing Spathoglottis in beds as I have suggested, a place well away from trees must be chosen for they will not do really well where there is competition from tree roots.

Thorough preparation of the beds is most important and the best way of ensuring this is to start by removing the existing soil to a depth of at least a foot; the subsoil should then be well broken up with a changkol or fork and be left rough. Above this should be placed a 6 inch layer of well burned earth made up of all the large pieces which will be found in the soil heap after burning; nothing smaller than pieces the size of an average apple should be put in this layer; the next 6 inch layer should be made up of burned earth which has been sifted to remove all dust and smaller particles; a ¼ inch sieve may be used. Mix this rough burned earth with well decayed compost or old cattle manure in the proportion of 3 parts earth to 1 part compost, and after it has been put into the bed top dress with an organic fertilizer—bone-meal is excellent—at the rate of about 4 ozs. to 1 sq. yd. of bed.

The two 6 inch layers of earth and compost will have filled the bed to slightly higher than the original soil level and a final layer of about 4 inches should be put in to ensure that when planted the Spathoglottis pseudo-bulbs are well above ground level. The final 4 inch layer should be of rough burned earth only; the fact that little or no plant food exists in this top layer will encourage vigorous rooting and the new roots will go deep in their search for the compost or manure which was incorporated in the lower layer.

When breaking up old clumps of pseudo-bulbs, whether from pots or from beds, care should be taken to injure them as little as possible, though if the clumps are very large they should be divided carefully to allow room for further expansion.

As much of the old soil as can be removed without undue injury should be discarded and all dead roots and pseudo-bulbs should be cut away; leaves should

be cut back to about six inches from the pseudo-bulbs to prevent excessive evaporation after planting.

When putting the new plants into the prepared bed a slight depression should be made in the top layer of rough soil into which the clumps of pseudo-bulbs is inserted with the living roots spread evenly around; soil can then be drawn over the roots and made moderately firm to hold the new plants secure but care should be taken that the pseudo-bulbs are not covered. The clumps should be spaced about a foot apart.

If planting is done during rainy weather shading should not be necessary, though this is beneficial if the weather is very hot and dry.

Watering should be regulated according to weather, and it is advisable to make sure that water does not lodge in the heart of the back bulbs where the old leaves have been shortened; such a condition may lead to rotting and for this reason it is best to water between the plants rather than over them.

Subsequently treatment should consist of the removal of dead and discoloured leaves, seed capsules and old flower spikes to maintain the bed in a tidy condition.

Feeding at intervals will keep the plants flowering continuously no matter what the weather, and can take the form of weekly applications of clear liquid manure (cow dung in water, strained), small top dressings of blood meal or other organic fertilizer at intervals of about two months, or small quantities of old cattle manure spread evenly between the clumps and left rough; it should not be broken up fine.

Spathoglottis appear to be practically free from disease in this country though they are often attacked by the species of coffee beetle which damages Vanda Joaquim, and thrips can be a great nuisance and will spoil the flower spikes if left uncontrolled. Scale insects sometimes do a lot of damage; they appear to be brought to the plants by small ants.

I have found that a solution of derris (tuba root) is the best specific against the two first mentioned. It should be sprayed to deter the coffee beetle but the best way of dealing with thrips is to take a bowl of strong solution and dip each head of flowers and the new spikes of unopened buds on a hot afternoon; those thrips caught among the flowers will be killed and the solution drying on the unopened buds will discourage further attacks by these minute insects. The best way of dealing with scale insects is to remove as many as possible by gently pinching between the forefinger and thumb those parts of the leaves which are infested and then treating with a kerosene soap emulsion. An easy and effective method of applying this is to take a flat, soft-haired paint brush, the 1 inch size is convenient, and with this wet the bases of the leaves where most of the insects will be found to congregate.

For pot culture a modification of the above method of growing is advised.

After crocking the pots or tubs, burned earth should be graded in the receptacles with large pieces to about half depth, above this rough burned earth and compost or manure to within a couple of inches of the top, then a layer of

burned earth only into which the pseudo-bulbs are planted leaving them just above the rim. Subsequently treatment may be as advised for growing in beds.

In restricted receptacles such as pots or tubs feeding will have to be on a rather more generous scale and the plants will be able to take considerably more water than those in beds.

Spathoglottis affinis.

This delightful plant is a deciduous species indigenous to this country; its natural habitat is the open rocky places at about 2,000 ft. on some of the mountains of the Peninsula where it grows among coarse grasses and stunted *lalang* in poorish shallow soil exposed to nearly full sun. When given suitable treatment it grows very well indeed at sea level and flowers profusely in its season.

The most important point in its cultivation is to ensure very thorough drainage and for this reason the growing medium should contain nothing which will clog and prevent the free passage of water.

The small flattish pseudo-bulbs or tubers should be planted into pots when they begin their growth about early April.

The pots should be thoroughly crocked and then filled to two thirds depth with rough burned earth from which all dust has been removed. The final layer into which the tubers are to be planted should consist of coarse sand, or finely broken burned earth from which all dust has been removed, and old compost in the proportion of four sand to one compost. A small amount of bone-meal can be incorporated to provide that little extra which makes all the difference; one level desert spoonful will be ample for a ten inch pot.

The tubers should be planted just below the surface, and not more than six large or eight small ones should be put into a ten inch pot.

After planting keep the pots in a moderately shady place and water sparingly until the new shoots are an inch or so above the soil; when this stage has been reached the plants can be watered liberally and they should be gradually accustomed to a more sunny position; a place which affords full sun up to 9 a.m. and thereafter light shade will do admirably.

The first flower spikes should appear during August and the plants go on flowering until December.

The inflorescence is unlike that of *S. plicata* in that the flowers are produced at wider intervals on the stem, with the result that the general appearance is more that of a lengthened spike than the rounded head of flowers of *S. plicata.*

Colour varies from a rather pale to a rich deep yellow and I have seen spikes bearing as many as twenty open flowers at one time.

In shape the individual flowers are very similar to those of *S. plicata* and they continue to appear at the extremity of the spike as the lower ones die off; if seed capsules are removed a spike will continue to produce flowers for more than six weeks.

Leaves and flower spikes are somewhat lax and inclined to droop so that careful supporting with thin bamboo stakes is desirable to prevent damage from wind and rain.

About the end of the year the plants will gradually die down completely; water should then be withheld and the pots removed to a dry place where they can be left undisturbed until the following March or April.

When the time for replanting arrives the tubers should be turned out of the old pots, great care being taken not to injure them when separating for repotting. The tubers increase three to four fold in a season if treatment has been correct.

The resting period is most essential and the plants will not flower well unless the tubers have been given a dry rest of two to three months.

NEW OR INTERESTING ORNAMENTAL PLANTS

BY

R. E. HOLTTUM, M.A., F.L.S.,
Director of Gardens, S.S.

Lobelia dresdenensis.

A recent consignment of seeds bearing the above name, from the University Botanic Garden at Basel, Switzerland, has given excellent results in Singapore, and this Lobelia should prove a useful addition to our range of flowering herbaceous plants.

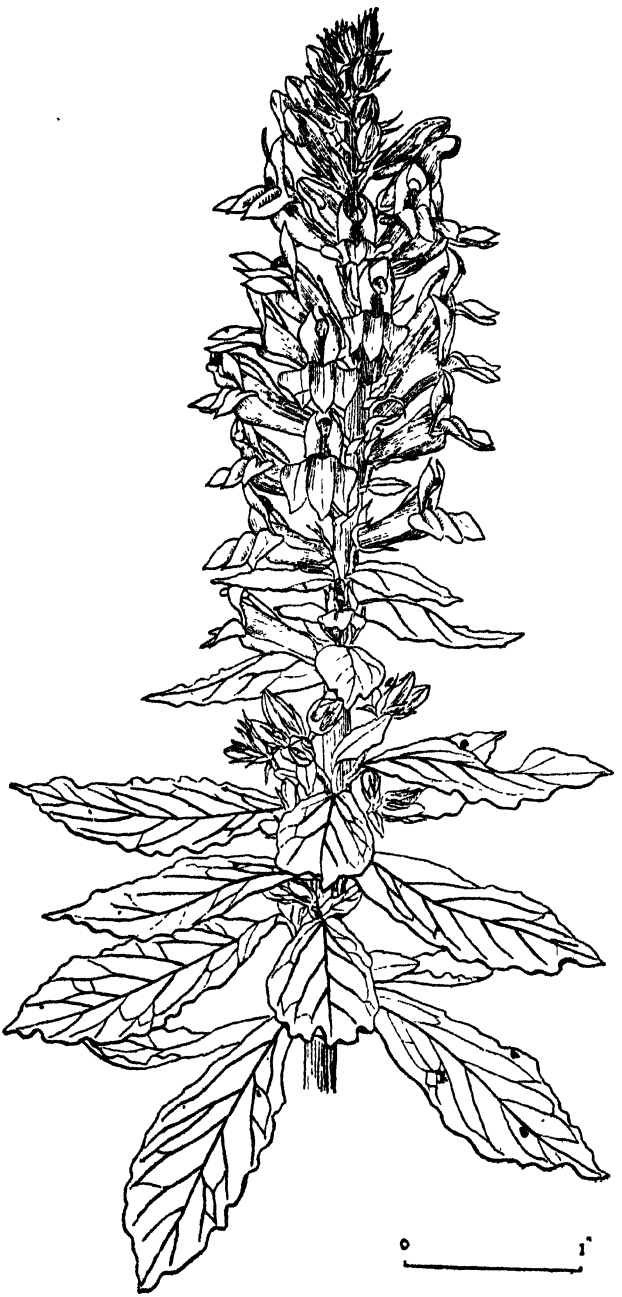
The name *Lobelia dresdenensis* does not appear in any book at our disposal, but from the close resemblance of our plants to *L. syphilitica* there is little doubt that they represent a variety or hybrid of that species. The larger species of Lobelia, including the red-flowered *L. cardinalis* and *L. fulgens*, have been much hybridized in Europe, but the blue *L. syphilitica* seems to have been less used.

The genus Lobelia is a large one, its species occurring in many parts of the world. It was named in honour of Matthias de l'Obel, a Flemish botanist born in 1538. The small blue-flowered species *Lobelia erinus*, so well known in Europe as an edging plant, is native in South Africa. There are related species in Australia. Two small species are also native in Malaya. The larger red-flowered species, and *L. syphilitica* are native in N. America.

Lobelia syphilitica is a perennial herbaceous plant, native in the eastern United States, growing in moist places. In cultivation in England it is quite frost-hardy, and is used in bog-gardens, moist borders, or beside streams in large rock gardens. It has been known in cultivation in Europe since 1665, having been introduced on account of its reputation as a medicinal plant among the American Indians; a reputation which does not appear to have been substantiated, though other species of the genus have useful medicinal properties. *L. syphilitica* was grown in the Botanic Gardens, Singapore, for a few years from about 1910 onwards, but appears to have been only moderately successful.

The plants of *Lobelia dresdenensis* have grown to about 18 inches high, in pots, each plant producing 8 to 12 erect stems, all flowering simultaneously. The leaves are light green, thin in texture with finely crinkled and toothed edges, spreading straight outwards, very close together. The flowering spike is about 3 inches long when in full flower, after which the lower flowers wither and new buds open at the top, this process continuing for about a month. Small flowering branches also develop later below the old flowers. The flowers are a pretty blue-mauve, with three petals pointing downwards and two upwards; the group of stamens with their black anthers (all joined together) and the stigma protruding from among them, appears between the two upper petals. The petals are all pointed, the three lower ones being joined together laterally.

The numerous stems of each plant all grow quite erect, and with their closely placed leaves make a compact mass of foliage, from which rise the flower spikes. A plant with twelve spikes all in flower together makes a good show of



Lobelia dresdenensis. A single flowering shoot.

colour, and the distinctive shape of the flowers is very attractive. The compact habit of the plant is superior to the rather taller and more lax habit of *L. syphilitica* as grown in England.

The plants so far grown in Singapore have produced a small proportion of seeds, and these have been grown on again into plants quite as good as their parents. If we have a hybrid, it is at any rate fixed in character. Propagation by small green cuttings, as in Hydrangea, is also possible, but seedlings make stronger plants of better shape.

When the plants have finished flowering, the main stems die back, and at their base a crop of new shoots appear. If the old stems are cut back to ground level, the new shoots will develop, as in Hydrangea plants; we have not yet produced a satisfactory full new flowering growth in this way, but there seems no reason why it cannot be done.

This Lobelia has so far been tried only in pots, in a burnt earth mixture, in the same way as most annuals are treated; but its robust growth suggests that it could be bedded out quite satisfactorily. It would make a useful plant in a mixed border. Probably the fact that *B. syphilitica* is adapted to wet ground helps it to tolerate our wet climate.

A Yellow Crossandra.

A yellow Crossandra has recently been introduced into the Public Gardens at Kuala Lumpur, and is distinctly attractive and free-flowering. It is clearly a variety of the well known species *Crossandra undulifolia*, sometimes called the Singapore Geranium, which has flowers of a bright salmon shade in compact heads, and is useful both in pots and borders. This Crossandra is native in southern India and Ceylon. The yellow variety may be the Ceylon var. *crocea*, but it does not exactly agree with the description given by Trimen.

The yellow variety grows to about the same size as the salmon one, but is lighter and more graceful in appearance, as the leaves are less closely placed, the branching more open, and the flowering heads on much longer slender stalks. Though the colour of the flowers would be described as yellow in comparison with the ordinary variety, they match with the second tint of the colour known as Cadmium Orange in the new *Horticultural Colour Chart*. They are in fact a full orange-yellow, of very good quality.

Propagation of this variety is just as easy as with the common form of the species. Cuttings root without difficulty, and very fine pot plants can be produced with the usual burnt earth technique. We have not tried the yellow variety in borders, but there seems no reason why it should not be successful in this way also. Good drainage and generous manuring are the needs of the ordinary Crossandra; and also a careful watch for scale insects must be kept.

Both the normal form and the yellow variety of Crossandra produce seeds occasionally, but it is usually easier to grow them from cuttings. Someone ought to try to raise hybrids between them.

The White-flowered Brunfelsias.

Brunfelsia is a genus of the potato family, named in honour of Otto Brunfels, the author of the first of the great herbals of the Renaissance period,

which marked the beginning of modern systematic botany. Brunfelsias are shrubs with beautiful and fragrant flowers, native in the American tropics. In Malaya two groups of species or varieties are in cultivation; the one group, with white or creamy-yellow flowers, comes from the West Indies, while the other group, with blue-mauve flowers turning white when old, comes from Brazil.

The commonest species of the West Indian group is *Brunfelsia americana*. It was brought into cultivation in European hot-houses more than 200 years ago, and doubtless reached the eastern tropics at an early date; there is no exact record of its first introduction to Malaya. It is now a fairly common garden plant, but still not so abundant as it deserves to be. To other species here described, *B. undulata*, appears to be of recent introduction; as noted below, it is much finer than *B. americana*, and at its best is one of the handsomest white-flowered shrubs which can be grown locally.

Brunfelsia americana usually attains a height of about 5 to 6 feet, but may perhaps grow taller; in Jamaica it is said to reach 14 feet. It is an erect bushy shrub, much branched, with simple entire leaves. The leaves are usually about 2½ inches long by 1½ inches wide, broadest near the apex, which is pointed, narrowed gradually towards the base. They are dark green above, paler beneath, with several pairs of clearly visible oblique veins.

The flowers are produced fairly frequently, in flushes, one in each leaf-axil. Each flower has a short stalk, and a short cup-shaped calyx with 5 teeth, from which protrudes the corolla-tube. The corolla-tube is slender, about 2½ inches long, and expands at the apex into the five flat round petals which form the showy part of the flower, about 2 inches across. Four stamens are enclosed within the tube. The whole of the corolla-tube and petals are white when the flowers open in the evening, but soon turn pale yellow; the flowers are very fragrant. After the flowers, round orange-coloured fruits about ¾ inch diameter are freely produced; each fruit when ripe has a thin shell which breaks open and liberates numerous seeds.

Brunfelsia undulata differs from *B. americana* in the following characters. The plant is taller in growth and much less branched (it is said to attain 20 feet in height in the West Indies). The leaves are longer, widest about the middle, usually with shorter stalks, the veins not distinct. The flower-stalks are shorter, the calyx is twice as large, the corolla-tube is longer (commonly about 3½ inches long) and the flower larger (to 3 inches across) the petals with beautifully waved margins; the flowers open pure white and remain almost white.

It is the larger and more handsome flowers which are the conspicuous feature of this species. The flowers are produced frequently, and are very fragrant. The only disadvantage of the species is its lack of natural branching, on account of which careful pruning is needed to bring the plants into a good shape. All plants of this species flower simultaneously, probably as a result of some definite stimulus, such as rain after dry weather, or a sudden fall of temperature.

Propagation and Cultivation. Both species of Brunfelsia may be grown from seeds; both also from woody cuttings or marcots. *B. americana* produces seeds very freely; *B. undulata* less freely in Singapore, but still sufficiently to provide

Brunfelsia undulata.

amply for propagation. Plants grow well by themselves as specimens in separate beds, or they can be grouped with other plants in shrubby borders. They will stand full sun, but grow and flower well also when shaded for part of the day.

Brunfelsias may also be grown successfully as pot plants, and flower just as well when grown in this way. For good growth, either in beds or pots, they need good drainage (that is, a well-aerated soil) and manuring from time to time. They are not rapid growers, but quite fast enough to show results in a reasonable time. Plants established from marcots will flower within a few months and continue to flower at frequent intervals.

There is a third kind of white-flowered Brunfelsia in Singapore. This has leaves similar in shape to *B. undulata* but rather larger and thinner in texture, the young leaves being somewhat purplish. The flowers are about as large as those of *B. undulata*, but with less wavy petals, and a small clayx as in *B. americana;* the petals also turn distinctly yellowish when old. This plant is perhaps a hybrid; its origin is unknown. It does not seem to be so free flowering as either of the others.

THE CULTIVATION OF MAIDENHAIR FERNS

BY

J. C. NAUEN,

Waterfall Gardens, Penang.

Ferns, especially those of the maidenhair type, are ideal subjects to use for the more permanent decoration purposes within the house or on the verandah. They are comparatively easy to grow and, if given the right growing conditions, remain in good condition for a long time. Their position in the house or on the verandah is universal although a medium to strong light position will be found to suit them best.

To grow ferns properly it is essential that they should have the right kind of soil and food. For general purposes the potting soil should consist of:

3 parts burnt earth or good garden soil.
3 parts leaf mould.
1 part peat moss or fern root fibre (coconut fibre dust may be used but it is not so well suited).
½ part dry, well rotted cattle manure.
½ part broken bricks (old mortar rubble is excellent material and may make up half of this part).
½ part coarse sand.
½ part charcoal.

Bone meal may be added at the rate of a small handful to each bucket full of soil. The whole of the mixture should be fine enough to pass through a ¾ inch sieve.

The sterilizing of the soil, though not essential, deserves consideration. Soils which have been sterilized are free from undesirable organisms, are more friable and usually have a longer lasting-in-freshness quality than those untreated. The sterilizing of soil is quite a simple operation and may be attempted by any small gardener. Firstly, the potting compost should be prepared, with the exception of including the bone meal, and then the whole of the mixture should be subjected to a thorough "baking." A bakery can be made by supporting a piece of iron sheeting on four old kerosene tins. A thin layer of soil placed on the upper surface of the iron will soon become heated or "baked" if a keen fire is kindled underneath. Ten to fifteen minutes baking will be sufficient to ensure the soil being well sterilized. An occasional stirring of the soil will hasten matters.

Prior to potting, each pot should be thoroughly washed and dried. A mere scraping out of the old potting soil is not sufficient. The pots should then be filled a little more than half full with good drainage material (broken bricks or potsherds are best); and, as a precaution against clogging, a thin covering of partly decayed leaves should be placed over the top of the drainage material.

It is preferable to use seedling ferns to begin with, although selected growing parts from old plants will do well. The seedlings establish themselves quicker. One or more plants should be planted together in a four or five inch size pot. Larger size pots are not advised. A too abundant quantity of soil about the roots of the young plants is difficult to manage and apt to get sour through over-watering.

In potting, the crown of the plants should be placed deep enough so that they will be covered with from ¼ to ½ inch of soil. The soil should be made moderately firm about the roots. If the texture of the soil at the time of potting is " moist," a thorough watering after potting should be sufficient to last the plants for a few days and subsequent watering will depend upon the individual plants' needs. Too wet or too dry a soil at any time is to be avoided. A soil which is moderately moist the whole time is best suited.

The re-potting of the plants into large and more permanent pots will, of course, be determined by their activity. Re-potting should not take place until such time as the plants have become well established and there is a good pot full of active roots. The potting compost at this time may be of a coarser texture and contain an extra ½ part of manure.

The size of the pots should not be more than 8 or 10 inches. Plants will remain in good condition for several years in a medium-size pot if they have been well potted and are given an occasional bolstering with an artificial fertilizer or manure water.

No feeding of the plants should be necessary until they are well established. To begin with, periodical watering with dilute manure water will be sufficient. Subsequent feeding may be alternated with a good compound chemical fertilizer.

Nitrate of potash or one of the other potash manures is considered the best fertilizer for ferns. The rate of application should vary, gaining in strength as the plants become more established, 1 oz. to 2 gallons of water being the maximum strength. If the artificial is to be given dry, as much as will lie on a 10 cent piece may be given to each plant once every three or four weeks. Fowl manure should not be given to ferns at any time.

Pests as a rule are not troublesome. The only ones which are likely to cause any annoyance are a small green caterpillar, a white, thread-like scale insect and worms. The former two can be kept under control by spraying frequently with clear water and periodically with insecticide. Worms may be got rid of by watering the affected plants with " Clensel insecticide."

In conclusion a word about tying. I have seen many fine specimen plants spoiled by crude methods of tying. Ties on all plants, especially ferns, should be neat and as inconspicuous as possible. It is suggested that stout wire should be used in place of bamboo and that thin string or strong wool should be used for tying. No plants should be " bundled up." Each separate stem or collection of stems should be tied separately. Supporting wires should not protrude beyond the foliage. Ample support is given if the wires extend about two thirds the length of the fronds. Ferns with heavy and drooping fronds may require a little more support, however, but stiffness must be avoided with such plants.

RANDOM NOTES FROM A BORNEO GARDEN

The last issue of the Magazine has again proved to be an interesting one, particularly the miscellaneous notes. The method given of growing bougainvilleas is certainly well worth trying. Our own bougainvilleas have been allowed " free range " as they were needed to cover wire netting fences, but recently we saw a splendid display of these bushes in a friend's garden, and intend to experiment on some ourselves. These bougainvillea bushes were kept quite small and grown in tubs or large pots, and were flowering profusely.

Our orange coloured bougainvilleas have come into bloom but the pink shade is too much in evidence and therefore rather disappointing. Only the very young flowers are a true orange colour. I understand this variety is a bud variation of the " Mrs. Butt."

We are very pleased with our *Gloriosa rothschildiana.* The new suckers have come on well, but we have not transplanted them yet. The pot containing the original plant now stands on the south side of the fern house, and has nearly covered one panel of the hexagonal building. There are several bunches of flowers, and at the moment the plant looks likely to flourish. As far as we can ascertain it is the only one in the district, at least in flower. As mentioned before, this plant is not indigenous to the East Coast although growing profusely and almost wild on the West Coast, and we have great difficulty in growing it here, having had several previous unsuccessful attempts. The grotesque flowers of this graceful creeper add colour to the assorted blooms already growing through the roof of the fern house. Inside the building are several pots of scorpion orchids, Vanda Joaquim, assorted bougainvilleas, asparagus ferns, and various other plants, and these have grown through the spaces between the roof timber, and flowered outside. The asparagus fern grown thus has done particularly well and rather contradicts the rule that ferns require shade.

Our latest experiment is an attempt at Dufay-Color films. The first lot of negatives although not good enough to print off were sufficiently clear and colourful to spur us on to further efforts. True, one negative showed a very good photograph of the sky with a stray branch across the corner, and a friend holding another one upside down remarked, " Awfully good," but the real thrill was in the COLOUR. The sky was a glorious blue, and the " Mrs. Butt " showed her magnificent crimson as a background to a brilliant green lawn. The green garden seat and red " Lido " umbrella showed up well, although the human subjects under it did not. We shall hope to be able to report better success in the future.

Our latest acquisition is " Teddy," a pet squirrel. He and his baby sister fell from a coconut palm, so we could not put them back into their nest. Unfortunately the cats caught little sister whilst we were rescuing Teddy. He lives in a large wire netting cage hanging on the verandah and is thriving and growing rapidly. He is as tame as such timid creatures ever are, and is very easy to feed, eating almost any raw fruit and vegetable with the exception of groundnuts, which are roasted. He is very partial to Cold Storage oranges and

pears, although not caring for apples ! As a pet he is very amusing and interesting to watch, carrying out all the habits of his wild relations, from hoarding his food, to making up his straw bed by rolling up little bundles and carrying them round and round in his cage in a wheel-like direction and finally depositing them in the selected spot. He is supplied with drinking water but is rarely seen to touch it. He is very nervous and when allowed out of his cage goes scuttling back at the least sound.

We were recently given *carte blanche* to plan, design and superintend the making of a nearby garden, converting it from a coconut estate. The final effect is voted pleasing which is very gratifying, and the owners were able to cut flowers from the garden on the very day they moved into the new bungalow. As we write, there is a good show of red and white lilies, duranta flowers, cannas and morning glory, and in about six months it should be a still more colourful garden.

In the vegetable world we have not been very successful and fear that, despite the possibilities of cauliflower growing in the tropics, we shall still have to get ours out of a tin or from Cold Storage. At a rough estimate, allowing for cost of seed which did not germinate, gardener's wages, extra hand for sterilizing soil, and one thing and another, the lettuces have cost us about $1 each and tomatoes about double !

A planter friend recently sent us some English cucumber seed and we have a few sturdy plants with fruit at present the size of gherkins. The donor says, " Have your English cucumbers grown well ? We have about a dozen cucumbers on ours all about 6 to 9 inches long, and some small ones beginning to grow, so I hope the plants bear up until the fruit is ripe," and goes on to say, " I am still thrilled about my five dozen carnation plants. About three dozen are all in bloom—lovely colours—and all the others in open beds (covered with atap) are either in bud or bloom." This is indeed a great achievement. We thought we had done well when sometime ago we grew a few plants in pots.

Another keen gardening friend writes from England with an ache in her heart for her Borneo garden. She says, " Borneo seems very far away these days, though gardens and flowers can always so vividly recall other gardens, and the happy associations of our mutual interest in the East."

Now to close on a more cheerful note. The editor of the *North Borneo Herald* has once again reprinted our random notes. This time we are *not* eating worms. In fact we were Dreaming Great Dreams of some far distant future fame when a familiar voice broke into the reverie, " I say, hurry up, there's a nice little job for you in the garden. The weeds in the zinnia bed . . . . . "

D. I.

THE CONTROL OF INSECT PESTS *

Regarding the control of insect pests, it is most essential to know what type of insect is causing the damage and also to have some knowledge of its habits.

Insects may be divided roughly into two categories, those with biting mouthparts and those with sucking mouthparts.

In the first mentioned category are grasshoppers and their larvae, cockroaches, caterpillars of moths and butterflies, beetles and their larvae. Insects with sucking mouthparts include plant bugs, aphids and scale insects.

It will be seen then, that the control of insect pests depends to a great extent on their mode of obtaining nourishment. If an insect with biting mouthparts is the culprit, it is obvious that some kind of stomach poison must be employed in its control.

For the other type, a contact poison must be used, that is to say, a poison which acts on the insect through its integument or through the spiracles, as the apertures through which the insect breathes, are termed.

Damage caused by biting insects is usually not difficult to recognise, since pieces of varying sizes will be seen to have been removed from the leaves or part of the plant attacked. With sucking insects, the effect is of another type. The attacked parts of the plant will exhibit discoloured spots, or wilt may occur. On the other hand, however, it is not infrequent for holes to appear in a leaf which has been sucked by this kind of insect. Such holes are due to the breaking down of tissue as the leaf expands during growth. The discolouration following the sucking by plant bugs is due to decay set up by the saliva which is injected when the bug is about to feed and which is not entirely sucked back during feeding.

The insects with biting mouthparts most commonly seen in gardens are the grasshoppers *Valanga migricornis* and various night flying beetles. *Valanga* is a large yellowish insect which seems to prefer various palms and Cannas as food, but on rubber estates it has been known to damage young rubber and also Mimosa. It is not usually the case that this grasshopper appears in such numbers as to warrant the spraying of the attacked plants with a stomach poison, but if this should be considered necessary, a spray of lead arsenate solution should be used. This should be mixed in the proportion of 2 lbs. to 50 gallons of water. An advantage of this spray is that it will remain effective for some weeks, provided the spraying is carried out in fine weather, when the solution will soon dry off and leave a deposit of the poison on the plant.

The night flying beetles are perhaps the most troublesome of garden insect pests. Among these, the chief are *Apogonia cribricollis*, *Adoretus* and *Lepadoretus vitticauda*, *Apogonia* being the most abundant and destructive.

These insects conceal themselves during the daytime in the soil, generally at the base of the plants they feed on. At dusk, they leave the soil and fly to the leaves. Apparently there is only one flight, lasting from dusk till about an hour later.

Lead arsenate should be used when one is dealing with these beetles, but, that again depends on the extent of the planted area and the number of plants

* A lecture given by Mr. N. C. E. Miller, Entomologist, Department of Agriculture, S.S. and F.M.S., to members of the Selangor Gardening Society on 5th July, 1939.

affected. If both are small, it will be more profitable to carry out a systematic hand collection, and, as a further measure to control them, digging in a small quantity of calcium cyanamide near the plants should be tried.

A well-known and troublesome pest of Vanda orchids—both in the larval and adult stages—is the beetle *Lema pectoralis*, a yellowish insect about a quarter of an inch in length. Its larva lives in a yellow or reddish slimy secretion on the blooms and when it is about to pupate secretes a whitish foamlike substance which hardens and forms a kind of shelter.

Daily inspection of beds of Vandas and the removal of all the stages of the beetle, namely egg, larva, pupa and adult, all of which may be found at one and the same time, is generally all that is necessary. Frequent spraying with a solution of tuba root, about 2 lbs. of root to 10 gallons of water, is a useful remedy which also deters ants, destroyers of young beds. Vanda orchids and other plants seem to benefit greatly if sprayed frequently with tuba root, possibly because the substance has some manurial value.

Regarding tuba solution, it is interesting that if the solution is sprayed on plants in a protected situation, it remains effective for a couple of days or so. Some years ago, I was experimenting with various kinds of tuba extracts, and, in the course of the experiments, found that certain beetle larvae would die without feeding if placed on their habitual foodplant which had been previously sprayed with tuba. The plants used in this experiment, were, of course, protected from sun and rain.

A lead arsenate spray for Vanda orchids attacked by *Lema pectoralis* would be effective, but it has the disadvantage of rendering the blooms and stalks unsightly owing to the greyish deposit which remains.

Another orchid pest is the beetle *Cullispa 12-maculata*, a small yellow black-spotted insect which attacks Spathoglottis chiefly. For the controls the treatments which I have mentioned for Vanda orchids should be applied.

I should have included termites among the biting insects. The insects unfortunately are more commonly termed white ants, but since they are neither white (except the very young larvae which are rarely seen) nor are they members of the ant family, it is a pity that the use of the correct name is not more widespread. Termites will attack weakly plants or plants suffering from injuries and, as a rule, if the injuries of the plants are not too deep-seated, the application of fertilizers of the kind designed to increase vigour will be effective in reducing the incidence of attack.

Recently methods of dealing with termites damaging the roots and lower parts of the skins of plants came to my notice. Whether they were effective or not, I am unable to say, but they were cheap and easily prepared.

One method consists of digging in 2 to 3 bunches of tobacco refuse in a trench one foot deep around the affected plants. The other method is to boil half a sack of tobacco refuse in 10 gallons of water, the resulting solution being allowed to stand for 12 hours. This solution may then be used as it is or diluted with water, to impregnate the soil in which termites are present. I am sorry to say that I have no details of the degree to which the solution should be diluted.

However as a control measure for soil-inhabiting termites, I see no reason why it should not act as a temporary palliative.

The small ant, *Solenopsis geminata* may occasionally be a nuisance in some gardens by removing freshly sown seed from boxes or beds. There are two principal methods of dealing with these insects, one perhaps being too obvious to require mention, that is, the isolation of seed boxes by mounting them on legs and placing them in containers filled with kerosene or disinfectant fluid and water. To protect seeds sown in the open, more elaborate precautions are essential. When it is desired to sow seeds in a bed, the top should be covered with a layer of soil mixed with kerosene, just sufficient kerosene to make the soil friable. On the top of this a layer of clean soil in which the seeds may be sown is spread. Another method is to mix powdered naphthalene with the seeds when sowing them.

Injury to plants by sucking insects is not very frequent, but now and then, one comes across an outbreak of the plant bug *Physomerus grossipes* which attacks several kinds of plants, but mainly Ipomoea. All the stages are usually present, and may be satisfactorily controlled by hand-picking. If extremely abundant, they should be sprayed with kerosene emulsion.

Scale insects and aphids do not generally appear in such large numbers as to cause serious damage to plants, and can usually be destroyed by hand. If abundant, kerosene emulsion should be used.

Now, finally a few remarks regarding the preparation of spray solutions. The usual proportions in which lead arsenate solution should be mixed are 2 to 3 lbs. to 50 gallons of water. Lead arsenate is sometimes sold in the form of paste, in which case somewhat larger amounts are necessary. When using lead arsenate as a spray it is important to remember that the container should be repeatedly shaken in order to maintain the poison in suspension. If this is not done, the lead arsenate will sink and form a thick sediment at the bottom of the receptacle.

The ingredients required for the preparation of kerosene emulsion are water, kerosene and common soap, and if only small quantities of the emulsion are required at one time, a convenient way of measuring them is to use cigarette tins which usually hold ½ pint.

For the preparation of sufficient stock solution for use in an average sized garden, 4 tins of water, 8 tins of kerosene, and ¼ lb. of soap are required. The soap should be dissolved, the receptacle should be removed from the fire and the kerosene added.

When it is required for spraying, one tin of this solution to 7 tins of water is necessary, and care should be taken to ensure that the mixture is complete and that there is no free kerosene present. If there is, there is a certain risk of injury to sprayed plants by burning.

Tuba root solution is easily made and perhaps does not call for further comment.

To deal with large numbers of the various insect pests, some of them important, others of little importance, would take up much more space than is available.

MISCELLANEOUS HORTICULTURAL NOTES

Ageratum.

The species much cultivated as a summer bedding plant in England, *A. mexicanum*, is obtainable in many varieties, the best of which are the dwarf blue forms. Little Blue Star, the best kind I have yet tried, is an excellent compact bright blue strain; two others worth trying are Blue Ball, which is taller and bears large heads, and Imperial Dwarf Blue, paler in colour and not so compact. There are also pink and white varieties none of which are as attractive as the blues.

Seed should be purchased from a reliable supplier and sown immediately it is received. The usual methods of seed-sowing in pots may be adopted; shade is of course necessary till after the seedlings have been pricked out and are well established in boxes. The plants can be potted up and grown in a sunny spot that nevertheless allows the roots to be kept cool; or they may be put into the open ground, shaded for a week, and then given full sun. I have had quite good results from both methods and have noticed that Ageratum will grow and flower almost as well in poor soil as in well-manured places, as long as plenty of water is available, though the flowers were by no means freely produced in either case.

There are two Ageratums common in waste land in Malaya: *A. conyzoides*, a straggly plant, often no more than a weed, with pale blue flowers of no horticultural value; and a larger and more showy plant, probably a variety of *A. mexicanum*, common on Penang, Taiping and Fraser's Hills and possibly other places; this when sown in the plains grows very well and produces bright mauve flowers in abundance but does not establish itself so well or grow into such an attractive plant as at high altitudes.

GORDON H. SPARE.

Lobelia.

The free-flowering varieties of *Lobelia erinus* such as Mrs. Clibran are well worth growing as pot plants. They are fairly compact and short and even if a few straggly plants do appear they are quite attractive hanging over the sides of the pots. Seed must be sown thinly and plants pricked out as soon as large enough to handle; it is always safer to use sterilized soil as the plant is liable to be attacked by damping-off disease.

I have found that most flowers are produced on plants grown in a shady place, say a part of a verandah or porch. They do not object to a little morning sun. The blossoms in no case are abundant but their bright blue colour makes up for lack of numbers.

GORDON H. SPARE.

Vegetable Notes.

Lettuces. The variety of Lettuce with which I have had the greatest success is Cheshunt Early Giant, which was raised by the Cheshunt Glasshouse Research Station in England for early forced crops in heat. The seeds were obtained direct

from England, sown on arrival, and at intervals of 2 weeks afterwards, in pots. They were treated in the usual way, finally being planted in the open, shaded for a week and then grown in full sun, water being given regularly. They soon made tight little heads, crisp and bright green. They must be cut directly they have headed as they soon run to seed.

Sugar Peas. Though by no means an economical crop, Sugar Peas of any good variety, but preferably the dwarfer kinds, can be grown fairly successfully in the plains. They may be sown in well manured beds in the open and shaded for the first week or so after germination. Water should be given regularly if no rain occurs, and sticks are necessary for support. The pods should be plucked while still young and green; the whole pod is eaten and has the same delightful flavour as the ordinary pea.

GORDON H. SPARE.

Propagation of Annuals from Cuttings.

Annual plants are so called because in seasonal climates their life is limited to one year; such plants are enabled to survive the winter or unfavourable season by producing seeds, which are sown in the following spring. In Malaya, such " annual " plants may produce three or even four generations in a year, but the term annual is retained for convenience. These plants are normally propagated from seeds, whereas we propagate most woody plants from cuttings, marcots or grafts.

It is possible however to propagate a number of such annual plants from cuttings. In a former issue of this Magazine it was reported that cuttings of African Marigolds and *Tithonia speciosa* would grow satisfactorily. The cabbages grown from cuttings on Penang Hill (see our last issue) are also normally annuals. We have now to report that two more annuals, namely Petunias and Nasturtiums, can be propagated in this way.

It may be suggested that as Petunias produce seeds in large quantities there is no need to propagate them from cuttings. But there is one advantage in the latter method that may outweigh any disadvantage, namely the fact that cuttings reproduce the characters of the parent plant exactly, whereas seedlings may vary, and frequently do so when we are concerned with garden hybrids. Many gardeners in Malaya have probably introduced a fine variety of Petunia and gradually lost its original beauty in growing successive generations of seeds. This loss is avoided by the use of cuttings. Small green cuttings from side shoots on plants not too old will grow easily when put into sand, and develop into plants as good as their parents. This method has been used for some time past on Penang Hill, and a pretty violet shade of Petunia has been preserved. Recently the method has been used successfully in Singapore to propagate a very fine free-flowering deep purple variety.

Most Nasturtiums do not flower well in the lowlands of Malaya, but some of the dwarf kinds are fairly good. On Penang Hill some of them are excellent,

and are regularly grown from cuttings. We have not yet tried this in Singapore, but it should be adopted if any Nasturtium can be found which is really satisfactory under lowland conditions.

R. E. H.

Hyacinths in the Tropics.

A recent publication from the Landbouwhoogeschool, Wageningen, Holland, reports the result of a number of experiments on the shipment of Hyacinth bulbs to the Netherlands Indies and their subsequent treatment, with a view to discovering possible methods of producing Hyacinth flowers in the tropics.

There appear to be various possible methods of treatment; these must all provide the necessary temperatures for the various stages of growth and development. Bulbs while apparently resting must have a sufficiently long period at a fairly high temperature in order that flower buds may be formed. After planting, the early stages of growth must be at a rather low temperature, but when a certain stage has been reached the remainder of growth and flowering will take place at a high temperature.

The method by which bulbs may be had for flowering at any time is as follows. After digging the bulbs in May (in Europe) they are dried for a few days, and then stored at 2° to 4°C. (36° to 39°F.), and transported on the ship at that temperature. They may be retained at this temperature until needed for further treatment. After removal from the cool temperature the bulbs must be kept dry at about 26°C. (80°F.) for 8 to 12 weeks, to allow time for development of the flower buds. The bulbs are then planted at a temperature of 13° to 18°C. (55° to 64°F.) but not higher than this. These temperatures may be secured by growing the bulbs in cool storage, or on the mountains at an appropriate elevation (4,500 to 6,500 ft in Java). If the bulbs are grown at 13°C., they may be transferred to high temperatures (that is, to lowland tropical conditions) when the young shoot at the top of the bulb is 4 cm. long. If the temperature of growth is 18°C., this shoot must attain 8 to 10 cm. before transference to warm conditions.

Alternately, it is possible to ship the bulbs immediately after they have been dug in Europe and quickly dried. In this case the bulbs must be planted in a cool temperature, as above described, at the latest 4 months after digging. It is also possible to carry through the stage of flower-bud development in Europe and then to ship without cooling; but in this case also the bulbs must be planted 4 months after digging.

In Java there are a number of hill stations at elevations of from 4,500 to 6,500 feet, but in Malaya only Cameron Highlands. It should be possible, therefore, to produce Hyacinth flowers by planting out the bulbs at the Highlands at the right stage of development, and then to send them to the lowlands for flowering, Or, if anyone has cool storage space at his disposal, it would be quite easy to carry through the whole process in the lowlands.

R. E. H.

Reviews.

Seed and Potting Composts

By W. J. C. Lawrence, Curator, and J. Newell, Assistant Curator of John Innes Horticultural Institute, Merton, England. Published by Geo. Allen & Unwin Ltd. 1939. Price 3/6. 128 pp. 20 illustrations.

It has always been one of the difficulties of gardening in Malaya to decide upon the best composts for pot plants, not only because of the great variety of plants grown but also because of the varying qualities of soil available. Most gardeners in this country find it necessary to try various soils and mixtures before hitting upon the right ones and in many cases the compost suitable for one plant will be disliked by many others.

The authors of this little book set out to find a standard compost suitable for a great number of different species and have succeeded so well that, though the composts have been tried on many kinds of plants, they have not yet failed on a single one. As Sir Daniel Hall says in his Foreword " they tested the part played by each constituent of the composts by a series of experiments, each step was made secure before going on a stage, until in the end they have arrived at a couple of composts which may be termed optimum composts."

The book gives detailed instructions for selecting the ingredients and making the mixtures; it contains chapters on soil sterilization and cultural hygiene; and though it is written for pot plant growers in England it should be of great use in any part of the world.

Among the plants already grown successfully in the John Innes Composts at Merton are Browallia, Celosia, Gerbera, Torenia, Begonia, Canna, Exacum, Gloxinia, Nepenthes, Streptocarpus, Salvia, Petunia, Zinnia, some palms and several ferns.

G. H. S.

Bulletin of the Colonial Institute of Amsterdam

Published in collaboration with the Netherlands Pacific Institute, Vol. II No. 3, May 1939. fl.7.50 or 18 shillings per annum, post free.

The May issue of the above publication, which we received too late for review in our July number, contains an interesting article entitled " The Administrative System of the Netherlands Indies," by Dr. J. J. Schrieke, who was at one time Director of the Department of Justice in the Netherlands Indies. The article, which is to be continued in the next issue, reviews the development of the administrative system from the early days of 1596 when the first Dutch ships reached Bantam, in western Java.

The first Governor-General was Pieter Both, who assumed office in December 1610. The long line of Dutch Governors was interrupted in 1811 when the British took possession of Java and its dependencies during the struggle with Napoleon when the Dutch Republic had been incorporated in the French empire. Upon

the Netherlands regaining her position and becoming a Kingdom the British Lieutenant-Governor transferred authority to the Dutch again in August, 1816.

It is noticed that the Netherlands Indies has a funded debt which stood at 1,351 million guilders in 1938, and that the Budget for 1939 estimates a deficit of more than 21 millions on account of ordinary expenditure and nearly 22 millions for extraordinary expenditure.

The publication contains other articles of interest; including part II of "Chemistry Threatens Tropical Products," mentioned in our last review of this Bulletin.

H. L. B.

Selangor Gardening Society.

QUARTERLY NOTES

On the 30th August members of the Society visited the extensive gardens of Mr. Choo Kia Peng, C.B.E., at the latter's kind invitation.

On the 27th September members visited the Forest Research Institute, Kepong, and were conducted round experimental areas by Mr. Hodgson and Mr. Durant.

On the 18th October at the kind invitation of Mr. Tong Takin members paid a visit to the garden at his house in Treacher Road. Of particular interest was the large variety of Cannas—Mr. Tong Takin specializes in Canna hybridization—and Hibiscus, the latter, of extremely attractive colours, being imported from Honolulu. Also of interest was a Bougainvillea with variegated leaves obtained from a plant of Crimson Lake. Rather disappointingly the flowers show no difference from the parent plant.

Future Activities

At a Committee meeting held on the 18th October it was decided to curtail the Society's activities to quarterly meetings during present conditions.

B.

Singapore Gardening Society.

The Annual General Meeting of the Society was held at Abbotsford, Cuscaden Road, by kind invitation of Mrs. C. R. Cherry, on July 24th. The following officers were elected for the year 1939-40:

President	–	Mr. R. E. Holttum.
Vice-Presidents	–	Ven. Graham White.
		Mrs. C. R. Cherry.
Honorary Treasurer	–	Mr. W. W. Jenkins.
Honorary Secretary	–	Mrs. W. Schmidt.
Committee	–	Mrs. O. R. S. Bateman.
		Mrs. R. Renton.
		Mrs. C. Jackson.
		Mr. J. V. S. Brooke.

In conjunction with this meeting, a competition for cut flowers was held. The prizes were won by Mrs. C. Jackson, who exhibited a vase of very fine Dahlias, and Mrs. J. H. C. Read, who exhibited a beautiful arrangement of mixed flowers in a bamboo trough.

Mrs. Schmidt later resigned from her post as Honorary Secretary, and Mr. M. R. Henderson was elected by the Committee to replace her.

Subsequent meetings of the Society were as follows:

August 28th. Visit to the Pineapple and Fruit Experiment Station of the Department of Agriculture at Lim Chu Kang. Mr. P. V. Ormiston conducted a tour of the fruit plantation, and afterwards demonstrated bud-grafting of various fruit trees in the nursery.

September 25th. Visit to Chinese market gardens, conducted by Mr. Yap, Agricultural Assistant. Gardens were visited in two areas; near Braddell Road and at Seletar.

The programme for the rest of the year is as follows:

October 23rd. Demonstration of the handling of seeds and seedlings, at the Botanic Gardens potting yard, by Mr. G. H. Addison.

November 27th. Talk on Flowering Trees and Hedges, by Mr. J. C. Nauen, at 5, Anderson Road, by invitation of Mrs. C. Jackson.

December 18th. Visit to flower gardens in Orchard Road.

Date of issue	Date of issue.	Date of issue.